SOUTHERN POWER AND INDUSTRY

JUNE, 1950

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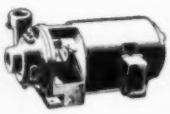
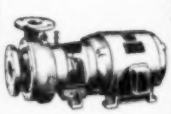
SSR Fractional hp.



Electrifugal 1 to 10 hp.



SSU 10 to 125 hp.

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5. Large opening in frame between pump and motor makes packing maintenance quick and easy.
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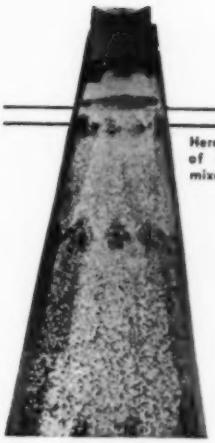
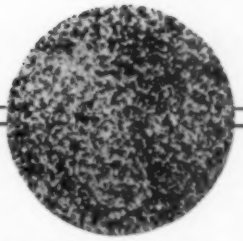
Entered as second-class matter at the Post Office, Dalton, Ga., under the Act of March 3, 1879.
Subscription Rates: United States and Possessions, $1.00 per year or three years for $2.00; Foreign Countries $10.00 per year.

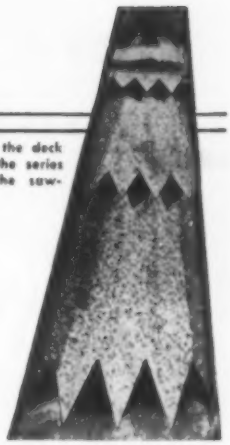
Volume 68 Number 6



Here you can see the action of two materials being mixed as they are conveyed.



This magnified view shows a mixture after being conveyed only 8 feet.



Here you can see the deck construction and the series of steps. Note the saw-tooth edges.

Interested in

MIXING · DRYING · COOLING?

Then you'll want to know more about this Jeffrey-Traylor patented Mixer or step type of Conveyor. Look at the photos — note the series of steps with saw-tooth edges. The material passes over these steps, the side slip discharge causing an intermingling of particles — turnover being partially or completely effected. Material is thoroughly mixed — even to two or more different materials.

This type of unit is especially good for conveying material being treated with infra-red or ultra violet lights — has been used on indirect dryers and coolers to increase the heat transfer. Highly effective and essential in roasting or toasting processes — possible to produce uniformly toasted material (throughout the bulk) when other methods have failed.

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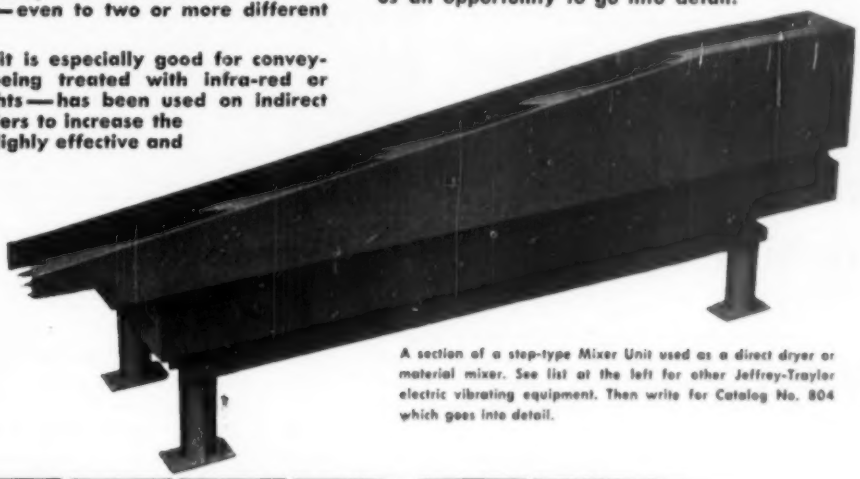
Dryers
Coolers
Conveyors
Screens
Barrel Packers
Packing Tables
Bin Valves
Bin-Level Controls
Waytrols



A section of a step-type Mixer Unit used as a direct dryer or material mixer. See list at the left for other Jeffrey-Traylor electric vibrating equipment. Then write for Catalog No. 804 which goes into detail.

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Established 1877

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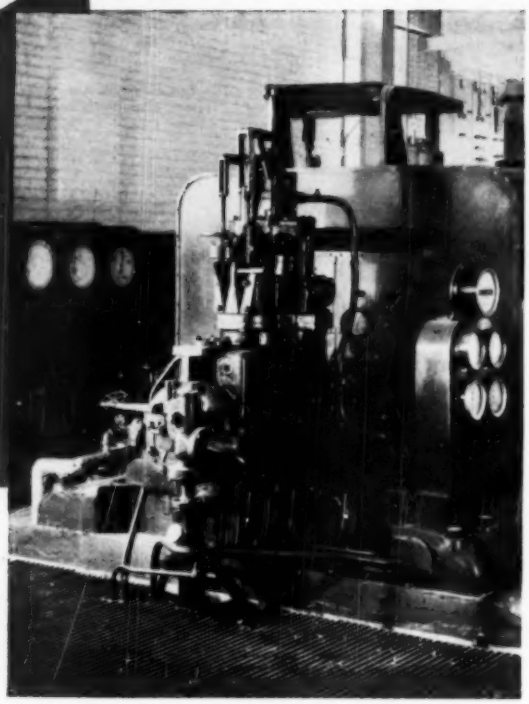
For Jeffrey-Traylor Equipment in Great Britain Lockers (Engineers) Inc., Warrington, England.

Here's your proof of

CONSTANT TURBINE SPEED



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Annual Subscription—$1.00
Foreign—$10.00

Published monthly at 115 E. Gordon, Dalton, Ga. by W. R. C. SMITH PUB. CO.

Publishers also of: *Textile Industries, Electrical South, Southern Hardware, Southern Automotive Journal, Southern Building Supplies.*

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Contents indexed regularly by Engineering Index, Inc.

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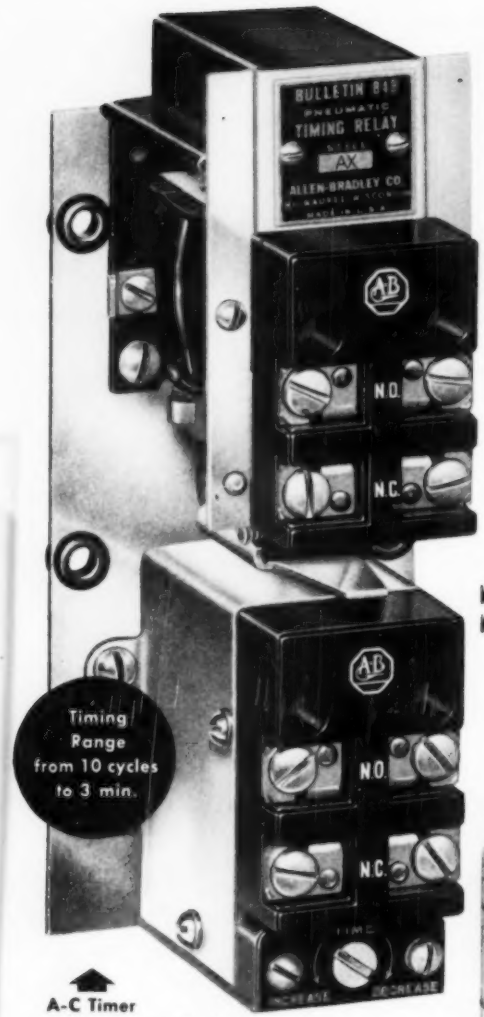
Editorial and Executive Offices: **SOUTHERN POWER & INDUSTRY, 806 PEACHTREE ST., N. E., ATLANTA 5, GEORGIA**



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A-C Timer with Auxiliary Contacts

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Bulletin 849

PNEUMATIC TIMING RELAY

Good for Millions of Operations

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This new, compact, solenoid type, pneumatic timing relay utilizes a synthetic rubber bellows for controlling the tripping time. Has a range of from 10 cycles to 3 minutes, and an accuracy of approximately ±10%. Its setting is easily adjustable over a wide range, and the relay resets instantaneously. This timer will provide satisfactory operation irrespective of temperature, humidity, or vibration conditions. Available with quick make and quick break, double pole, silver alloy main contacts—one set normally open and one set normally closed. Terminals are readily accessible from the front. A duplicate set of contacts for pilot control can also be provided, actuated directly from the solenoid. The unit can be readily changed from "dash up" to "dash down" operation by simply inverting the solenoid. Write for information on this new Bulletin 849 Pneumatic Timing Relay.

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Facts and Trends

FOR SOUTHERN INDUSTRIAL AND POWER EXECUTIVES

June, 1950

OKLAHOMA GAS & ELECTRIC'S first central station gas turbine was recently removed from service and completely dismantled. The February 4200 hour service report, summarized in this issue of SP&I, indicates that the unit has a reliability at least comparable to the best steam turbine records. The installation has been surprisingly free of "bugs" ordinarily experienced in starting any new equipment. Minor difficulties were not unusual or in any way attributable to the gas turbine design or operation.

LOUISVILLE, KENTUCKY'S TUBE TURNS, INC., has reduced POWER COSTS by improving their power factor. Installation of CAPACITORS increased their power factor from 80 to 97 per cent during the first month of operation, and it has since been between 96 and 98 per cent each month. The reduction in power cost created by this improvement of the power factor has amounted to an average of about $185 per month. At this rate, the cost of the installation will be paid off within a period of 22 months. James E. Barker, design engineer in the plant and production engineering department of Tube Turns, will describe the installation in an early issue of SP&I.

BUILDING SUPERSTRUCTURE of Potomac Edison's new 40,000 kw Riverton Station near Front Royal, Virginia, is a steel frame with H. H. Robertson Company fluted panel aluminum walls. Over 50,000 sq ft of 16 gage mill finish insulated and uninsulated aluminum panels were installed. Insulated paneling differs from uninsulated by addition of 1½ in. of preformed Fiberglas, isolated by unsaturated asbestos and backed by 18 gage flat, metal coated (galvanized) steel. Insulated paneling surrounds working areas to maintain more comfortable working conditions.

DALLAS, TEXAS' $5 MILLION ALFORD REFRIGERATED WAREHOUSES, featuring new methods of warehouse construction, unusual refrigeration design, and the utilization of mechanized handling, will be described in the July issue. General description is supported by detailed discussion of power generation, compressors, headers, ammonia condensers, receivers, oil separators, intercoolers, brine and water coolers, cooling towers and the electrical system.

Of general interest is the manner in which conventional fork trucks were utilized during the construction period. Iron pipe scaffolds built to fit the forks carried the nozzle operators while Guniting the side walls. They also served as welding platforms in the erection of pipe lines and also as painting platforms.

BALTIMORE, MARYLAND'S new publishing plant for the Baltimore Sun is one of the largest welded structures erected in recent years. Six story building has a floor area of 325,000 sq ft and contains 2200 tons of steel. The continuous welded structure used less steel tonnage, shallower beams requiring less fire-proofing, and offered savings in dead weight, and absence of noise during erection. All welding was done with sixteen 400 amp Lincoln Electric welders.

THE HOUSTON, TEXAS PLANT OF A. O. Smith Corporation, which will manufacture large diameter welded steel pipe for the oil and gas industries, will go into production in August. The 675 ft mill building will have two 80 ft and one 40 ft craneway aisles extending the full length of the plant which is situated adjacent to Sheffield Steel Corporation's steel plant along the Houston Ship Channel.

OVER 14,000 SQ FT OF CORRUGATED ALUMINUM JACKETING, a product of The Childers Manufacturing Company, Houston, Texas, was used as an exterior covering for anti-freeze protection of pipe lines at the 120,000 hp Lumberton plant of the Carolina Power and Light Company.

Four (4) square sheets (.005-in. thick) were wrapped securely around the asbestos roll insulation on the piping and fastened by applying single turns of 1½-in. wide black Scotch Electric Waterproof Tape, at approximately 1 ft intervals. Use of the aluminum jacketing supplants the application of 8 oz. canvas ducking with the outer roofing paper conventionally used for this purpose.

METAMICS—neither ceramics nor metals but a combination of the two—have two outstanding characteristics; they will stay solid at temperatures where metals are molten and they will not crack or break like ceramics when heated suddenly to high temperatures or rapidly cooled. Temperatures as high as 3000 F are encountered in current applications. Metamics are apparently easy to machine, particularly when tungsten carbide tools are used.

FIRST TRAINLOAD OF LARGE DIAMETER PIPE was shipped in April from the new pipe mill of U. S. Steel's Consolidated Western Steel Corporation at Orange, Texas. New mill will produce 50 miles of large diameter pipe a month when full production is reached, serving principally long distance oil and gas pipe lines.

MEASURING SYSTEM, which will electronically record pressures up to 30 MILES FROM POINT OF MEASUREMENT, has been announced jointly by Manning, Maxwell & Moore, Inc., and the Brown Instrument Division of Minneapolis-Honeywell Regulator Company. Typical application is continuous measurement of reservoir levels to reduce spill-over losses in cases where one reservoir is fed from others. System permits long transmission of pressure up to 50,000 psi.

UNNECESSARY MOTIONS contribute much to high production costs. Engineers should pre-determine the time required for every movement required by machines and by operators. In many cases, greater economies can be effected by figuring out how to make the job easier for the operator than how to make the machine work faster.

SIGNIFICANT INDUSTRIAL DEVELOPMENTS mentioned in a recent Southern Association of Science and Industry report are the construction of an $18 million plant in North Carolina to make cellophane from wood pulp; the building of a large plant in South Carolina to make a synthetic fiber, "Orlon"; a new rayon manufacturing plant in Alabama; and the construction of a large feed mill in Georgia.

The chemical industries of Texas, Tennessee, and Virginia are the new industrial giants of the region, but the establishment of these and many small new enterprises, such as cheese and milk processing plants, will eventually mean much to the South.

MANY A MATERIALS HANDLING SYSTEM OR MECHANIZED PLANT during the past six months, has had to demonstrate its economic value on the basis of reduced volume operations, some for the first time, according to R. F. Bergmann of the Link-Belt Company. Mr. Bergmann recently told A.S.M.E. and S.A.M. Winston-Salem, N. C. members that all industry has been watching this trend with interest, for there has been much apprehension and concern expressed over the high investments and fixed charges in such elaborately equipped and mechanized facilities. The Link-Belt chief engineer emphasized that those plants which have been carefully planned and built and are capably managed, have shown surprisingly low break-even points where selling prices in the industry have not been too seriously depressed.

VERSATILE NEW PORTABLE "PREPO" HAND TORCH lights instantly with a match, doing away with pouring, pumping and priming characteristics of ordinary blow torches. PREPO, compounded of petroleum hydrocarbons and packaged in a disposable container is self-pressurizing at normal temperatures. It takes about 30 seconds to remove an empty container, throw it away, install a new fuel container and be ready to go again.

Write the editors for additional information on any of the above items.
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HAZEL-ATLAS
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OKOLITE-OKOPRENE

SELF-SUPPORTING AERIAL CABLE

for
compactness
durability
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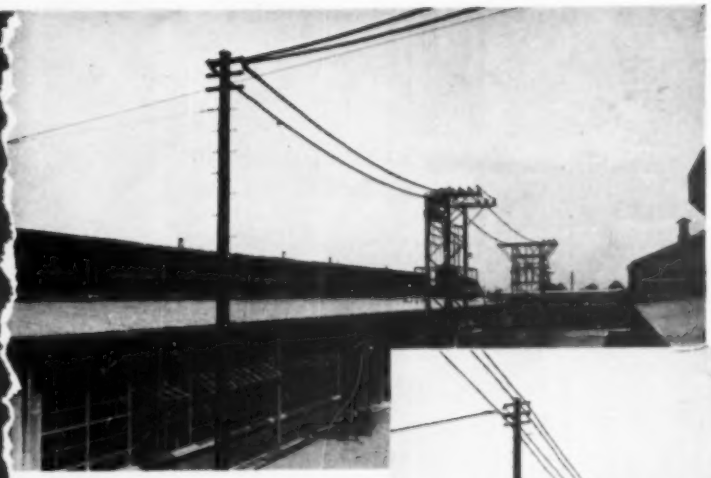
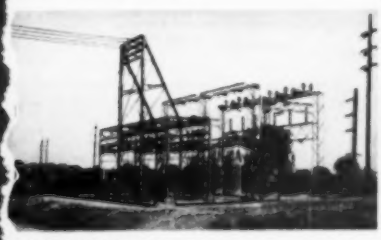
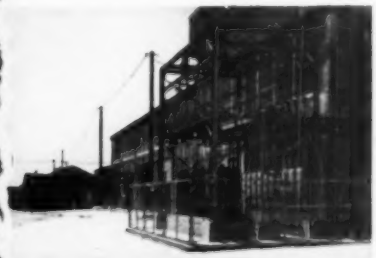


COMPACTNESS — self-evident space economy eliminates congestion, reduces clearance problems, gives a neater, more streamlined appearance in keeping with modern efficiency. Simple line tap, permitted with Okonite's Duolay* construction, serves the 2300/440 volt steel platform substation.

DURABILITY — no ring-cutting; permanently weatherproof, non-conducting Okoprene sheath; high-voltage, heat and moisture resisting Okolite insulation. These Okonite values mean long-lived, trouble-free circuits. Four circuits above are carried from station (background) on pedestal-mounted tubular steel poles with steel cross arms welded in place.



DEPENDABILITY — "stormsafe;" fewer service interruptions or outages; improved circuit regulation because of lower reactance; freedom from lead sheath troubles. 44kv/2.3kv jointly operated transformer and switching substation containing the Alabama Power Co. step-down transformer and the Hazel-Atlas Glass Co. outdoor oil circuit-breakers shown above.



ECONOMY — save on installation as well as maintenance costs with Okonite S/S cable. Reasonable first cost; simple, quick installation. Long spans require fewer poles; fewer items to be purchased and stocked. Exclusive Duolay assembly permits ample separation of conductors without cutting copper conductors or performing any operation on messenger. Practically no maintenance is required.

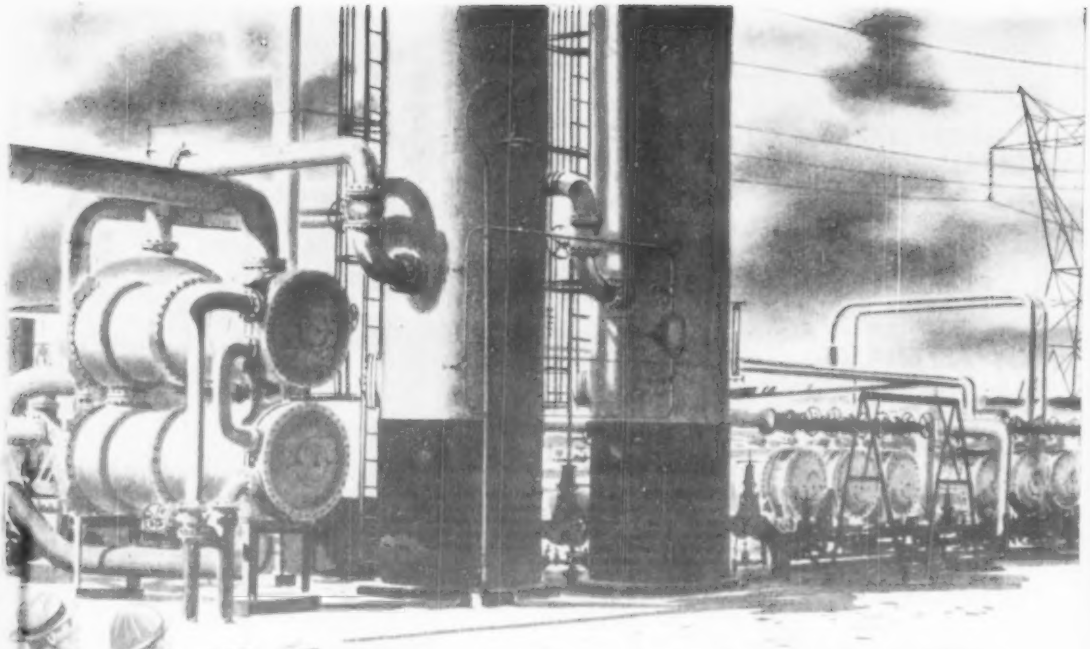
*U. S. Pat. 2430378

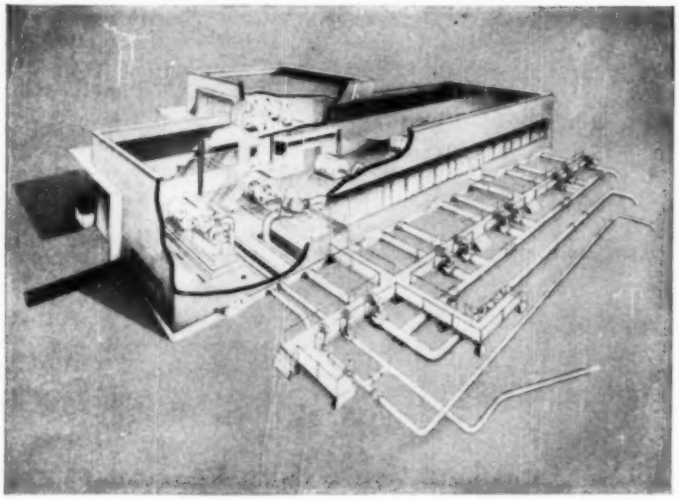
Four thousand feet of Okolite-Okoprene "Line-Tap" Self-Supporting Aerial Cable serve the new plant of the Hazel-Atlas Glass Company at Montgomery, Alabama. According to company officials, this installation provides a compact, durable and dependable arrangement, in keeping with the modern efficiency of the plant. It represents another proof of the advantages of Okonite Self-Supporting Cable for industrial applications.

Outdoors, on poles or on brackets attached to buildings – or indoors, where circuits can be carried overhead supported by beams or trusses – Okolite-Okoprene Self-Supporting Aerial Cables provide a modern, dependable and economical method of industrial power transmission. They are described in a 52-page manual available to electrical engineers and company executives. For your copy, send a request on your letterhead to The Okonite Company, Passaic, N. J.

THE BEST CABLE IS YOUR BEST POLICY

OKONITE SINCE 1878 *insulated wires and cables*





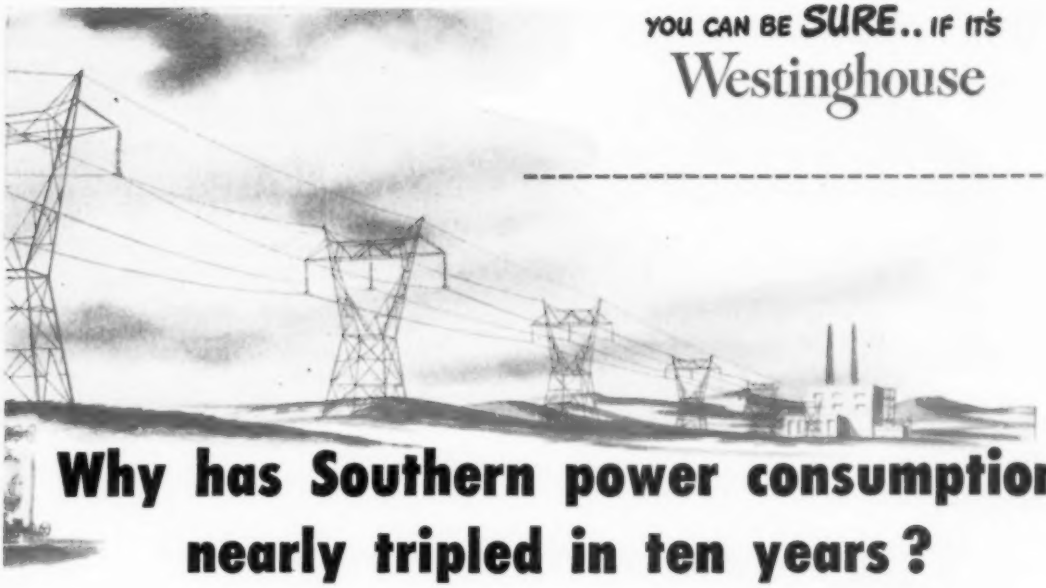
Cutaway drawing of typical pumping station on the new Ozark 22-inch pipeline.

Oil . . . More KW's to pump, pipe, refine it

Since 1939, the South's refining capacity has climbed 50%—and these refineries now buy more than one billion kwhr annually. Wells and pipelines use still more because electrification means big savings. Take the new Ozark "Big Inch" Pipeline. All the pumping stations have been completely electrified by Westinghouse—and the savings have been outstanding. Now, pushing a button causes a series of operations that quickly start the main pump units. In minutes, motors open valves that would take men an hour. And keeping this line at maximum through-put means $50 *a minute in revenue!*

Shell Pipe Line Corporation, operator of the Ozark line, is an outstanding advocate of electrification. It pays about $2,500,000 *annually* for cheap power.

YOU CAN BE SURE.. IF IT'S
Westinghouse



Why has Southern power consumption nearly tripled in ten years?

Ten years ago the watthour meters in the South registered 23 billion kilowatthours. In 1948 the total zoomed to a record-breaking 61 billion. That's close to a threefold increase in ten years—and a growth rate 30% over the U. S. average.

Why the big Southern increase? The chief reason: *industrial growth.* Industry uses three-fourths of the Southern power. And since 1939 the South's industrial output has climbed 277%. That's where the new kilowatts are going!

A basic element in this power and industry picture is the Westinghouse organization. Much of the South's electric power is generated by apparatus engineered by Westinghouse. And similarly, top-notch Westinghouse equipment helps growing Southern industry USE this power to best advantage. The ultra-modern oil pumping station on the opposite page is a good example.

To better meet the needs of Southern power and industry, Westinghouse early built manufacturing plants in the South—which today are handy to the markets they serve, and the Southern markets they buy from.

As a Southern supplier, customer, and producer, Westinghouse has a major stake in the South. Our policy will continue as before: developing Southern power, helping expand its use. And that makes your nearest Westinghouse office a good place to go when you want electrical help. J-94827

Westinghouse

A BASIC PART OF THE SOUTH

"Not a Single Solenoid Has Burned Out On Our Water Valves Since We Protected Them With FUSETRON dual-element FUSES"

"During the winter of 1948-49 solenoids on five of our water valves burned out due to freezing of the water.

"The replacing coils alone cost us about $50.00 but the labor and operating loss ran much higher.

"To prevent these losses we installed a Fusetron dual-element fuse to protect each coil.

"During the winter of 1949-50 we did not lose one single coil due to burnout — but we did blow quite a few Fusetron fuses.

"The cost of replacing these Fusetron fuses was nothing to the loss we would of had if they hadn't blown."

E. C. Willy, Chief Electrician
H. J. Kaiser Aggregate Plant,
Pleasant, California

FUSETRON
TRUSTWORTHY NAMES IN ELECTRICAL PROTECTION
BUSS

Fusetron (DUAL ELEMENT) Fuses

give 10-point protection

1. Protect against short-circuits.
2. Protect against needless blows caused by harmless overloads.
3. Protect against needless blows caused by excessive heating — lesser resistance results in much cooler operation.
4. Provide thermal protection — for panels and switches against damage from heating due to poor contact.
5. Protect motors against burnout from overloading.
6. Protect motors against burnout due to single phasing.
7. Give DOUBLE burnout protection to large motors — without extra cost.
8. Make protection of small motors simple and inexpensive.
9. Protect against waste of space and money — permit use of proper size switches and panels.
10. Protect coils, transformers and solenoids against burnout.

Fusetron DUAL ELEMENT Fuses

Give All-Purpose Protection

because . . . The fuse link element opens on short-circuit — the thermal cutout element protects on overloads — the result, a fuse with tremendous time-lag and much less electrical resistance.

They have the same degree of Underwriters' Laboratories approval for both motor-running and circuit protection as the most expensive devices made.

Made to the same dimensions as ordinary fuses — fit all standard fuse holders.

Obtainable in all sizes from 1/10 to 600 ampere, both 250 and 600 volt types. Also in plug types for 125 volt circuits.

Their cost is surprisingly low.

Don't Risk Losses

One burned out solenoid
One needless shutdown
One lost motor
One destroyed switch or panel

may cost you far more than replacing every ordinary fuse with a FUSETRON dual-element fuse.

Mail the Coupon Now

for complete information about Fusetron fuses and their 10 point all-purpose protection.

FUSETRON is a trade-mark of the Bussmann Mfg. Co., Division of McGraw Electric Co.

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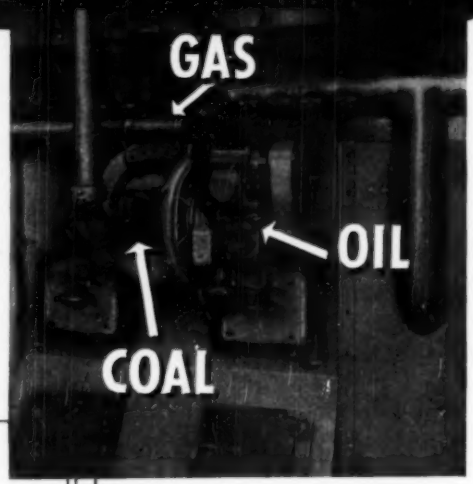
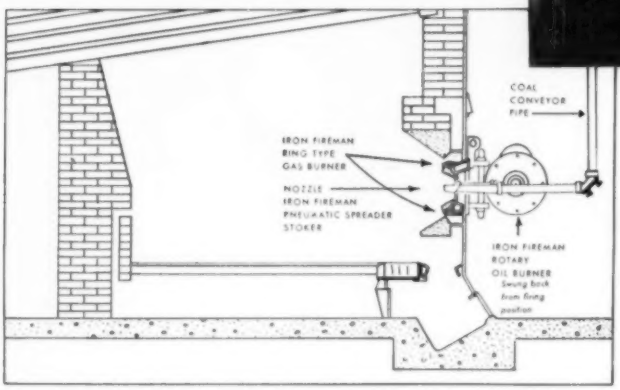
Iron Fireman Fires GAS, OIL or COAL in the same boiler

Switch fuels quickly

Guard your plant or buildings against possible fuel shortages. Protect yourself against high fuel costs. Equip your boilers to burn whichever fuel is lowest in cost or most readily available.

Iron Fireman builds and installs highly efficient automatic firing equipment for coal, oil or gas. It has also developed combination units for firing any two of these fuels—or all three—with quick changeover from one fuel to another.




COAL CONVEYOR PIPE
IRON FIREMAN RING TYPE GAS BURNER
NOZZLE IRON FIREMAN PNEUMATIC SPREADER STOKER
IRON FIREMAN ROTARY OIL BURNER
Swung back from firing position

Shown above is boiler front equipped for firing with coal, oil or gas. The Iron Fireman Pneumatic Spreader stoker delivers coal from hopper or from main coal bunker by pneumatic conveyor, and conveyor nozzle (shown here in firing position) accurately spreads the larger particles of coal over the entire grate in a shallow, uniform fuel bed. Preheated fines burn in suspension. For oil firing coal nozzle is withdrawn and Iron Fireman Rotary oil burner (for No. 6 oils or lighter) is swung into firing position. For gas firing the Iron Fireman Ring Type gas burner is used, in which stainless steel gas jets surround the firing port. In an emergency the fuel change can be accomplished in a few minutes.

Diagram at left shows three-fuel installation in straight tube boiler.

In many applications the Iron Fireman underfeed stoker can also be used in conjunction with the Iron Fireman gas-coal combination burner.

Iron Fireman engineers will gladly make a free survey of your boiler plant, and give you an estimate on firing equipment that will pay you new profits as well as insure you against losses due to changes in fuel prices and availability.

Write for illustrated folder to Iron Fireman Mfg. Co., 3246 West 106th St., Cleveland 11, Ohio. Plants in Cleveland; Portland, Oregon; Toronto, Canada. Sales, service and engineering organization covers the United States and Canada.

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In power or process piping, you'll

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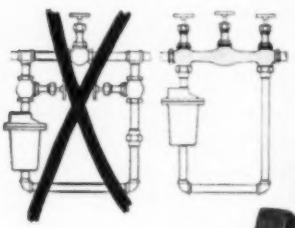
maintenance
weight
time

HONEYWELL BYPASS



Outmoded set-up at left uses 18 threaded joints . . . Honeywell Bypass uses only eight.

THE Honeywell Bypass is a completely assembled and ready-to-use unit . . . compact and convenient. It eliminates from eight to fourteen threaded joints . . . with the usual leakage and maintenance . . . and affords continuous, trouble-free operation.

Yet it costs no more than the assortment of valves, nipples, fittings, unions and pipes (plus the cutting, threading and assembling) that you may be using now. The Honeywell Bypass is available in Bronze, Iron and Steel . . . for pressures up to 300 lbs. . . . with screwed or flanged ends.

Call in your local Honeywell engineer for detailed information on this bypass and such other Honeywell products as: Hi-Lift Hand Control Valves, Transfer Valves, Low Lift Diaphragm Control Valves, Liquid Level Devices and Steam-Jacketed Rotary Cocks.

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A glass plant in Ohio . . . a chemical plant in West Virginia . . . a floor covering plant in Delaware . . . plant after plant, representative of virtually every branch of industry, has chosen the C-E Vertical-Unit Boiler, Type VU-10 to meet its particular steam requirements. Here are six important reasons for the VU-10's industry wide acceptance:

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The design, construction and operating features of the VU-10 meet all the requirements of a modern industrial plant. Small wonder so many diverse industries select this unit for their steam needs. If your requirements fall within the capacity range, 10,000 to 60,000 lb of steam per hour, it will pay you to investigate the VU-10. Our engineers will welcome the opportunity to discuss the matter with you or your consultants at your convenience. B-39

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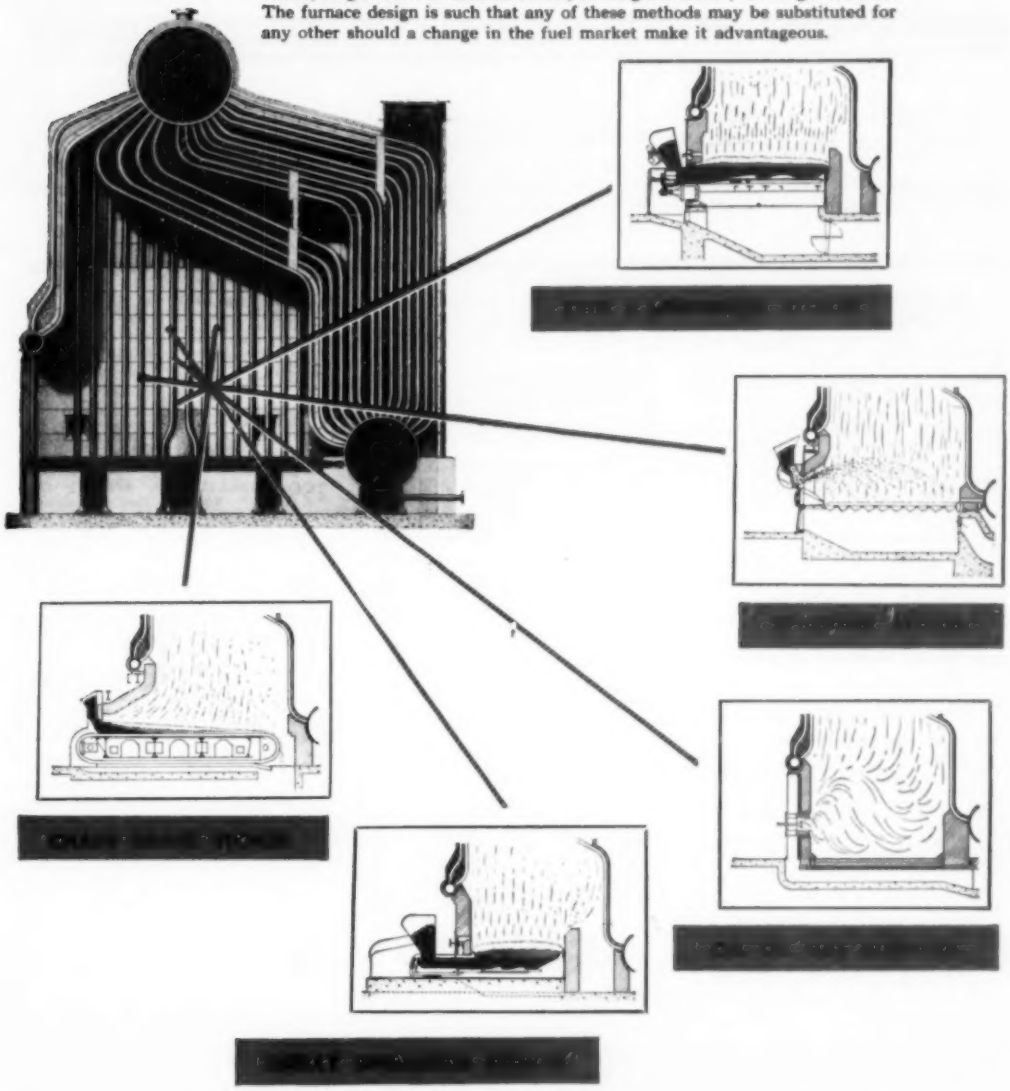

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387	407	410	428	433	447	448	452	456	469	474	480	503	527	528	539	561
575	588	595	599	605	628	632	653	668	671	680	718	730	742	754	778	805
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WATER TREATMENT, AIR CONDITIONING, REFRIGERATION

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730 HOT WATER HEATERS — Bulletin 800 describes the application of water blenders to give exact temperatures at point of use in all sorts of industrial plants for heating process materials, water for washrooms and gang showers and for general hot water use, with or without tank combination.—BARCO CO., INC.

742 WATER CONDITIONING — Bulletin 610—Gives information on the design and application of water conditioning equipment and chemicals, including water softeners, zeolites, filters, purifiers, aerators. Improved softener gives 44% more soft water per regeneration. — ELGIN SOFTENER CORP.

754 ICE MAKING EQUIPMENT — Bulletin 127-G—Illustrated with over 100 photographs and drawings the parts of modern ice-making plants of various types, from one-man automatic plants up. — FRICK CO.

778 STEAM HUMIDIFIERS — Bulletin 1772, 12 pages — Gives information on a complete line of steam humidifiers; discusses dry air problems, with tables on relative humidities and regains of materials. Data on operation and installation of electric and air controlled models. — ARMSTRONG MACHINE WORKS.

ELECTRICAL

805 COUPLING CAPACITORS FOR CARRIER CURRENT SYSTEMS—Bulletin 206—Describes Sprague capacitors for coupling radio frequency systems to electric power distribution lines in telephone communication, in remote switching, in telemetering, in fault detecting and other carrier current uses. — SPRAGUE ELECTRIC CO.

828 ELECTRIC TRANSFORMERS — Bulletins TU-13 and TU-56 — Describe the design and construction features that make Wagner liquid filled and dry type unit sub-station transformers outstanding—can be connected to any make of switchgear.— WAGNER ELECTRIC CORPORATION.

830 MANUAL MOTOR STARTER—Bulletin 609—Describes a manual starter available in enclosures for general, waterproof, dust tight and hazardous locations—with quick-make and quick-break silver alloy contacts and double overload breakers.—ALLEN-BRADLEY CO.

831 ELECTRIC HEATING — "A to Z With Electric Heat" is a booklet giving applications, with over fifty illustrations, of the use of electric heating for heating air ducts, ovens, presses, platens and all sorts of industrial uses.—EDWIN L. WIEGAND CO.

837 ALUMINUM CONDUCTORS — Free Booklet, "Insulation Questions and Answers" discusses insulated aluminum conductors and their applications. Charts, diagrams, illustrations answer basic questions—what conductor sizes, how handled, as actually installed, the details about joints and terminals.—ALUMINUM COMPANY OF AMERICA.

845 CUBICLES, PANELS, ENCLOSURES — Descriptive Booklet — "Contract Manufacturing in Sheet Metals"—Describes job-fitted control centers, bus enclosures, cubicles, switchgear housing and other sheet metal assemblies for utility and industrial plants.—THE KIRK & BLUM MFG. CO.

851 "FUSEOLOGY" — Handbook on Fuses—Intended to help maintenance engineers. Tells what to do when fuses blow, where to look for trouble—what to do after trouble is found—how to select the right type for various circuits—how to choose the proper size of fuse or Fusetron.—BUSSMANN MFG. CO.

870 ELECTRIC CABLE — Bulletin SP-1037 — Describes Okolite-Okoprene cables, possessing many advantages from the standpoint of installation, electrical operation, and design. Complete details as to dimensions, engineering data and application. —THE OKONITE COMPANY.

MISCELLANEOUS

1007 SHEET METAL PANELS, CUBICLES, ETC.—Descriptive Booklet—"Contract Manufacturing in Sheet Metals" describes job-tailored control centers, bus enclosures, cubicles, switchgear housings, panel and various other sheet metal assemblies for utility and industrial plant applications.—THE KIRK & BLUM MFG. CO.

1010 WELDING AND BRAZING ALUMINUM—A booklet, "Welding and Brazing Alcoa Aluminum"—Gives complete information on Tungsten-Argon welds, very successful in ever-increasing practice. Other types of welding and brazing aluminum.—ALUMINUM COMPANY OF AMERICA.

1035 UNIT HEATERS — Bulletin No. 150-4 describes unit heaters which give quick warm-up to meet sudden changes in weather conditions—horizontal and down blow, non-ferrous heating elements, full protection against expansion strains and stresses.—FEDDERS-QUIGAN CORP.

1036 GAS COMPRESSORS—Bulletin JM —Describes, with complete specifications, the type JM compressor, a 1 to 6 crank throw compressor rated at 500 to 2750 hp, driven by motor, engine or turbine.—COOPER-BESSEMER CORP.

1040 DUST RECOVERY — Booklet 32 pages—Outlines the theories and basic principles of centrifugal dust recovery, and the application of multi-clone units, with their advantages of adaptability, space saving, high efficiency and low maintenance.—WESTERN PRECIPITATION CORP.

1043 UNIT HEATERS — Bulletin BG-523-243 describes counterflow heaters which offer low first cost, working zone warmth, low operating costs, automatic controls, easy installation, long life, oil or gas fuel, immediate delivery.—DRAVO CORP.

1046 STEEL FABRICATING — Bulletin describes plate, structural and tank fabrication, as furnished by various plants in Alabama and Mississippi—for industrial, utility and marine plants. — INGALLS INDUSTRIES.

Continued on page 122

650-1

Please send me without obligation, free booklets described in the June 1950 issue of SOUTHERN POWER AND INDUSTRY as circled below:

9	10	31	44	47	52	66	68	87	104	120	127	142	149	183	184	190
207	214	216	237	245	258	259	268	273	279	281	284	287	313	317	325	367
387	407	410	428	433	447	448	452	456	469	474	480	503	527	528	539	561
575	588	595	599	605	628	632	653	668	671	680	718	730	742	754	778	805
829	830	831	837	845	851	870	1007	1010	1035	1036	1040	1043	1046	B30	B31	B32
B33	B34	B35	B36	B37	B38	B39	B40	B41	B42	B43	B44	B45	B46	B47	B48	B49
B50																

Also send further information on following New Equipment (see pages 112-121)

G1 G2 G3 G4 G5 G6 G7 G8 G9 G10 G11 G12 G13 G14 G15
G16 G17 G18 G19 G20 G21 G22

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List Items You Want, Tear Out and Mail One of the Attached Cards Now!

Please be sure to fill in your Firm's Name and your position on the Coupon. This service cannot be extended to you unless this information is furnished.

CHROMALOX
STRIP HEATERS
solve hundreds of heating problems

In straight lengths, curves, rings, segments and with fins. 4½" to 95" lengths; ¾" to 2½" width. Iron, steel and alloy sheaths.

efficient · dependable · low cost
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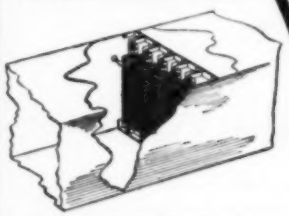
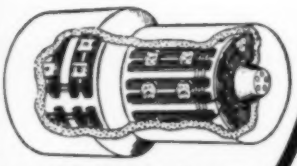
heat for Processes and products

TYPICAL APPLICATIONS



Chromalox Electric Fin-Strip Heaters mounted in air ducts.



Plastic extrusion barrel with Chromalox Ring, Straight and Curved Strip Heaters.

Easy to Install CHROMALOX Electric Strip Heaters give clean, dependable and accurately controlled heat. They are widely used in platens, dies, kettles, tanks, ovens, air ducts and other applications requiring accurate temperature control and around-the-clock service.

If you are a user of heat, either in processes or products, you can get many valuable application ideas by sending for the booklet below. On-the-job engineering assistance, without obligation.

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Electric Heat for Modern Industry

WANT MORE FACTS?
Send for this booklet of application ideas you can adapt for use in your plant. Write for your free copy today.

1C-50

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The high degree of skill acquired by Navco Engineers from long experience in solving unusual Piping problems is your guarantee of an accurate and workmanlike Piping System.

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TERRY

QUICK-STARTING
TURBINE
FOR FEED PUMP
EMERGENCY DRIVE

The turbine shown at the right picks up the feed-pump load in case the motor, which normally drives the unit, is inoperative. Thus the turbine must be able to start quickly and be completely reliable—characteristics which are assured by the generous blade clearances and one-piece construction of the Terry Wheel.

This is but one example of many special turbine requirements that are met by the Terry solid-wheel turbine. Details on how this and other Terry Turbines will meet your individual needs will be gladly supplied by a Terry engineer.

DATA

The turbine is 620 hp, 3550 rpm for 850 psi, 900F steam with 2.5 psi back pressure.

Installed in the Crawford station, Middletown, Pa., Metropolitan Edison Co. Gilbert Associates, Inc. were the consulting engineers.

T-117B

THE TERRY STEAM TURBINE COMPANY
TERRY SQUARE, HARTFORD, CONN.

Welded Steel Smokestacks for power plants

representative end-products of our complete facilities for the design, fabrication, and erection of special steel plate structures

There are two reasons why welded steel smokestacks are good examples of the type of steel plate structures we can furnish to meet the requirements of power generating stations, mines, mills, and industrial plants of all kinds.

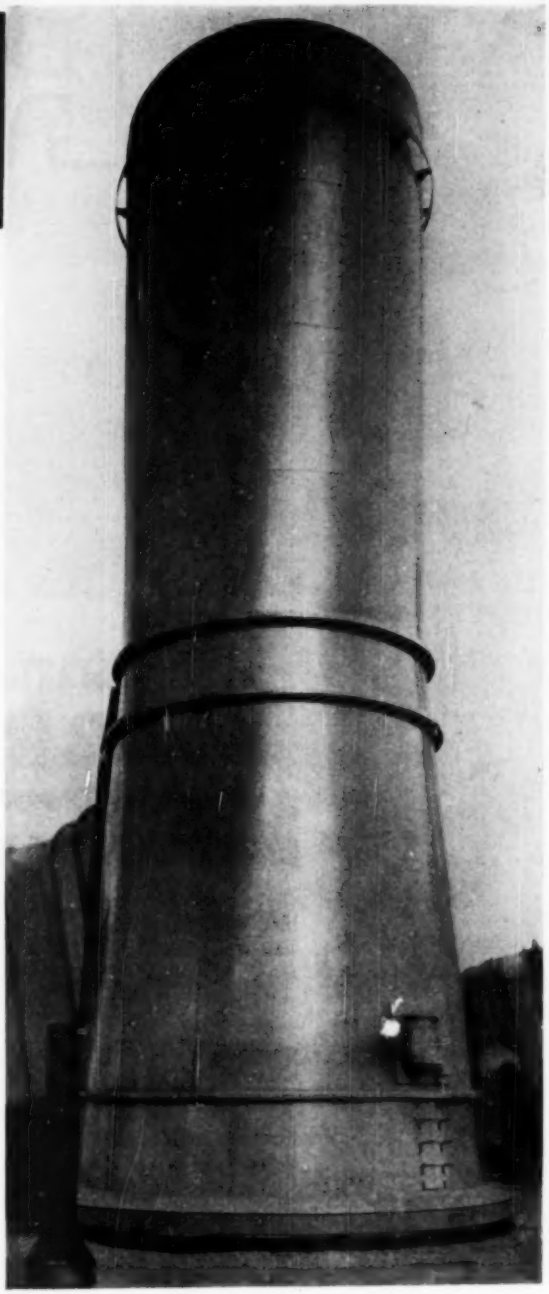
First, we have the ability and experience to provide the best design of smokestack or other structure to meet your specific requirements. If the engineering on your project is handled by outside consultants, we will work closely with them in preparing this design. Or if your own staff handles the engineering, we can either supply a design for a stack or prepare one according to your specifications.

Second, we have the adequate shop facilities, and the experienced field crews it takes to fabricate and erect, efficiently and economically, not only smokestacks but all other types of steel plate structures. We are equipped to x-ray vessels of all sizes, and to stress-relieve shop-built structures up to 13 ft. in diameter at Birmingham and up to 13 ft. 6 in. in diameter at Chicago and Greenville, Pa. We can stress relieve vessels of any length. Our shop technicians and field crews are experienced in fabricating and welding carbon steels, alloy steels and non-ferrous metals.

Installations for Southern locations are fabricated at our Birmingham plant and erected with our Birmingham Erection District field crews.

Write our nearest office for quotations whenever you need self-supporting steel smokestacks or steel plate work of any kind.

Right: 16-ft. diam. by 80 ft. self-supporting welded steel smokestack at a steam generating power plant.



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Birmingham 1.....1531 North Fiftieth St.
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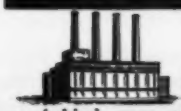
Tulsa 3.....1628 Hunt Bldg.

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY, *and* GREENVILLE, PA. *In Canada*—HORTON STEEL WORKS, LIMITED, FORT ERIE, ONT.

measuring steam-power progress in millionths of an inch



Indicative of the prodigious exploration and development work behind every technological advance in steam-electric generating practice are these scenes from B&W's new laboratory at Alliance, Ohio. Here, in one of the largest research laboratories of its kind, are conducted tests on the "creep" (plastic flow) and stress-rupture of metals. So precisely uniform are these testing units that temperatures are held to plus or minus one degree F at 1550 F; so accurate that specimen elongations are measured in millionths of an inch.

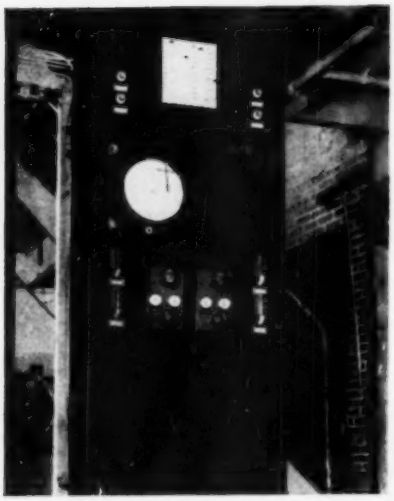
From such studies in steel come those savings in steam with which B&W Boilers and component equipment have been associated for more than 80 years. For these data on the behavior of metals under a wide variety of pressure-temperature conditions, along with investigations of fuel burning methods, heat recovery, and boiler design, are indispensable pre-requisites to the modern high-temperature, high-pressure boiler.

In the future, as in the past, B&W's great research organization will continue to contribute importantly to any project involving cheaper, more dependable power generation—will spend still more in helping you . . . and the power-consuming American public . . . to *save*.

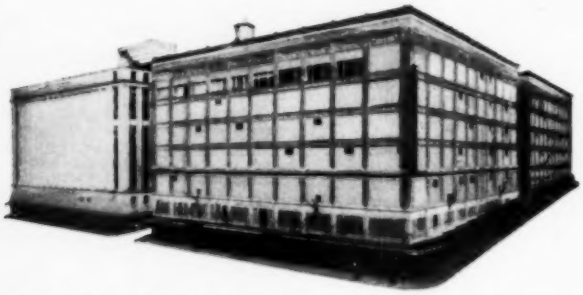
Helping Industry Cut Steam Costs Since 1867

BABCOCK & WILCOX

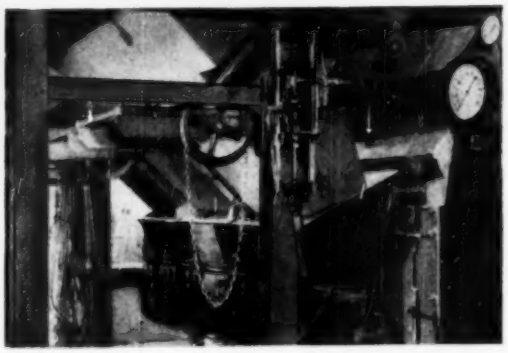
FIRST, HAGAN CONTROLS,
then HAGAN controls and meters . . .
AT F. & R. LAZARUS & COMPANY



Control panel of the new boiler at F. & R. Lazarus & Company, Columbus, Ohio, showing Hagan Ring Balance Boiler Meter.



The main buildings of F. & R. Lazarus Company occupy a full city block. Steam is used primarily for heating, but some is required for laundry and cooking.



View of front boiler. Hagan fuel control cylinder is shown in foreground. Boiler was installed by the manufacturer, Combustion Engineering Corporation. Edward E. Ashley of New York was consulting engineer.

The store of F. & R. Lazarus & Company in Columbus, Ohio—now managed by the fourth generation of the Lazarus family—would do credit to any city. Its main buildings now occupy a full city block, and additional buildings are used for special departments and services.

These main buildings represent an almost constant program of construction and modernization, which has been accompanied by necessary changes in the steam generating plant.

Hagan Control—a master sender, compensating relay, receiving regulators and balanced float controllers—was installed on two boilers in 1944.

Continued expansion of the store made further modernization of the boiler plant necessary, and in 1949 a new boiler was installed. This is stoker fired, has a capacity of 31,500 lb./ hr. and operates at a pressure of 125 psi.

Hagan Automatic Combustion Control was installed on this new boiler, and a separate panel was provided. A Hagan Ring Balance Boiler Meter measures steam flow and air flow.

Both Hagan Controls and Hagan Ring Balance Meters are characterized by simplicity, accuracy and dependability. Because of these qualities they are giving eminently satisfactory service in steam generating plants of all types and sizes, in all parts of the country.

For full information on either meters or controls, write to Hagan Corporation, Hagan Building, Pittsburgh 30, Pa.

HAGAN CORPORATION

BOILER COMBUSTION CONTROL SYSTEMS
RING BALANCE FLOW AND PRESSURE INSTRUMENTS
METALLURGICAL FURNACE CONTROL SYSTEMS
THRUSTORQ FORCE MEASURING DEVICES

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Service Entrance Cable—
Type SE With True URC
WEATHERPROOF Protection

Now, Anaconda gives you a completely new Service Entrance Cable that provides greater dependability, longer life, higher resistance to weather, with these 4 features...

1. **TRUE URC SATURANT** and Finish provide durable fibrous covering with excellent weathering properties.
2. **TOUGH NEOPRENE TAPES** cover each individual conductor — increase resistance to heat and weather... in 2 colors, black and red—give the preferred means of colored conductor identification.
3. **GLASS AND COTTON** combination over-all braid covering provides high resistance to deterioration and adds to life of covering.
4. **SILVER-FINISH COATING** provides for clean handling and an attractive surface... makes a greatly improved base for house paint—permits use of URC Saturant and Finish without discoloring externally applied paints.

To complete your information on the new Silvaline* URC-Type SE Weatherproof Service Entrance Cable, contact your nearest Anaconda Sales Office or Distributor.

Anaconda Wire & Cable Company,
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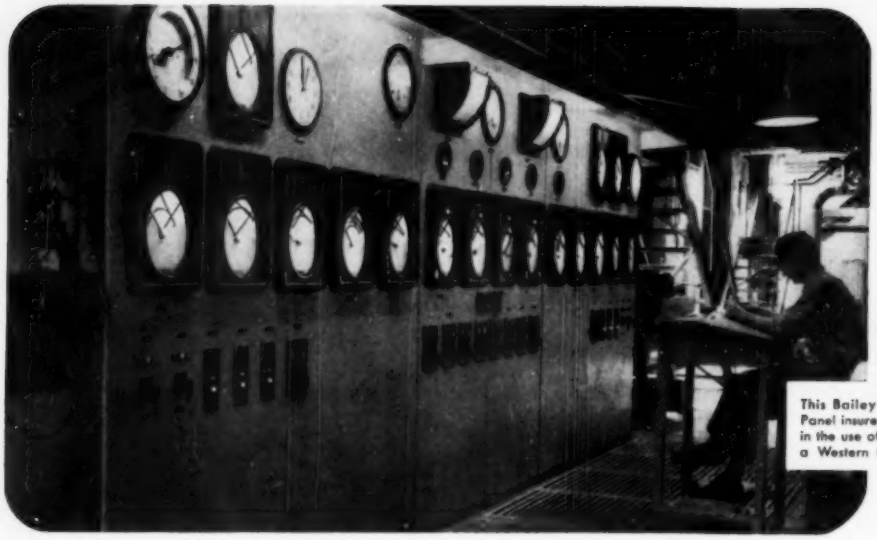
The right cable for the job

ANACONDA®
WIRE AND CABLE



This Bailey Boiler Control Panel insures high efficiency in the use of Fuel-Dollars at a Western Chemical Plant.

What's Your Fuel-dollar Efficiency?

A dollar's worth of fuel has the *same potential* energy, no matter who's boiler it fires. But how much of the energy actually gets converted to a usable form depends on how you operate your boiler.

That's where Bailey Controls can help. And, here's why, we believe, you'll get better fuel-dollar efficiency with Bailey:

1. **Complete Range of Equipment—fully co-ordinated.** You need never worry that a Bailey Engineer's recommendation is slanted in favor of a particular type of equipment, just because he has a limited line to sell—or that Bailey will pass the buck for efficient control; we offer *complete* boiler control systems.

2. **Engineering Service—backed by experience.** No other manufacturer of instruments and controls can offer as broad an experience, based on successful installations involving all types of combustion, flow measurement and automatic control.

3. **Direct Sales-Service—conveniently located near you.** Bailey Meter Company's Sales-Service Engineers are located in more industrial centers than those of any other manufacturer of boiler control systems; you get prompt, experienced service with a minimum of travel time and expense.

For better fuel-dollar efficiency—for more power per fuel-dollar, less outage and safer working conditions, you owe it to yourself to investigate Bailey Controls. Ask a Bailey Engineer to arrange a visit to a nearby Bailey installation. We're proud to stand on our record: "More power to you!"

A-109-1

BAILEY METERS

BAILEY METER COMPANY

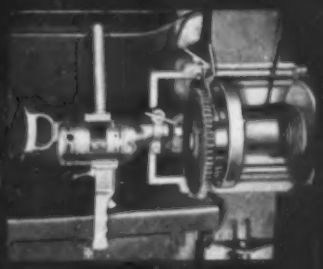
1028 IVANHOE ROAD
CLEVELAND 10, OHIO

Controls for Steam Plants
COMBUSTION · FEED WATER
TEMPERATURE · PRESSURE
LIQUID LEVEL · FEED PUMPS

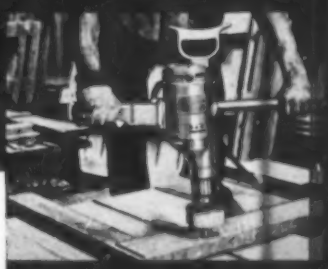
Grinding with SKIL Drill

IT'S MORE THAN A DRILL!

Wire brushing with SKIL Drill



Hoist powered with SKIL Drill



Reaming with SKIL Drill

Hole sawing up to 4 in. with SKIL Drill

Hack sawing with SKIL Drill

SKIL Drill speeds dozens of jobs . . . saves minutes and money on every one!

Look at the big variety of jobs these SKIL Drills are built to do. Their *extra* power speeds all ordinary drilling, makes easy work of heavy boring, reaming and hole sawing and equips them to take on special applications like powering hoists and pipe threaders.

SKIL Drills provide this extra power without extra weight. Die-cast housings (pioneered by SKILSAW) save important ounces in every model. Ask your own maintenance men about SKIL Drills. Take their word for it, and you'll standardize on SKIL Drills from now on. Call your SKIL Tools Distributor *today!*

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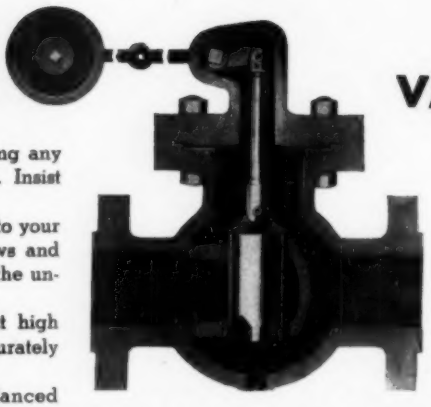
COPES
BALANCED VALVES



Wherever you use float valves, avoid losing any of your operating force in the stuffing box. Insist on low and constant valve stem friction.

Make sure of instant, accurate response to your actuating force—no matter what your flows and pressures—by demanding close control of the unbalanced forces found in every valve.

Provide for minimum pressure losses at high flows by requiring your valve ports to be accurately designed for the conditions you specify.

In other words—insist on COPES Balanced Valves. They offer all these important advantages —plus long service life with minimum maintenance. Write in detail about your needs.

With the COPES Type BI Valve, rotating stem means low stuffing box friction. Accurate balance assures quick and accurate response. Exact capacity you need is provided.

Float-operated COPES Type BI Valve controls flow of condensate from flash tank to storage tank.

Flow of blow-down water from a flash tank is controlled by this float-operated COPES Valve.

Water level in a deaerating heater is controlled by this float-operated COPES Balanced Valve.

NORTHERN EQUIPMENT COMPANY
603 GROVE DRIVE, ERIE, PA.

BRANCH PLANTS: Canada, England, France, Italy and Austria. *Representatives everywhere.*

Bulletin 443-B gives condensed data on all major COPES products. Write for a copy—your letterhead, please. Keep it for reference.

COPES

Headquarters for . . .

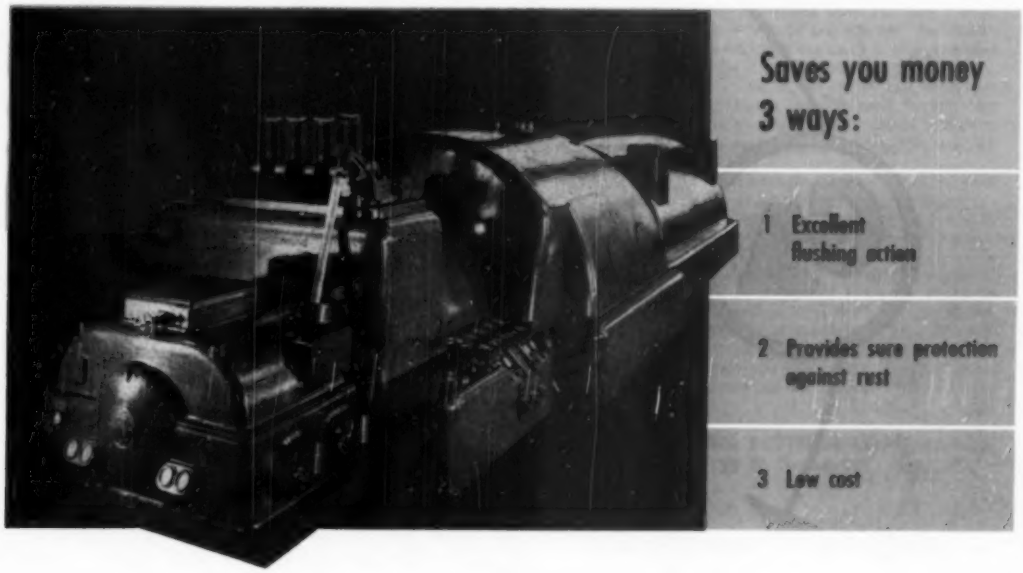
Boiler Feed Water Control . . . Excess or Constant Pressure Control, Steam or Water . . . Liquid Level Control . . . Balanced Valves . . . Desuperheaters . . . Boiler Steam Temperature Control . . . Hi-Low Water Alarms.

Make sure

the lubricating system of that new turbine is clean—

flush with

Gulf Turbine Flushing Oil



The surest way to thoroughly clean the lubricating system of your new turbine is to flush with Gulf Turbine Flushing Oil. It has excellent flushing action—removes grease-type slushing compounds, welding scale, chips, sand and other loose foreign matter. It is very effective in cleaning inaccessible parts of the system.

Gulf Turbine Flushing Oil has been fortified to provide an effective rust preventive film. You can be sure that all oil bathed surfaces in the system are completely protected.

An important advantage of Gulf Turbine Flushing Oil over other types (such as certain solvents) is that the undrained portion in the turbine systems does not impair the lubricating value of the turbine oil. For Gulf Turbine Flushing Oil is itself a satisfactory lubricant.

Only one-third to one-half of a normal turbine oil fill is required for thorough flushing. Thus the expense of flushing your new turbine with low-cost Gulf Turbine Flushing Oil is nominal.

Gulf Turbine Flushing Oil is equally effective for units already in service. In these it helps remove harmful sludge and organic acids—helps flush out deposits which may have collected in the system.

For complete information on this quality product and for recommended procedure for cleaning your turbine, call in a Gulf Lubrication Engineer. Write, wire, or phone today.

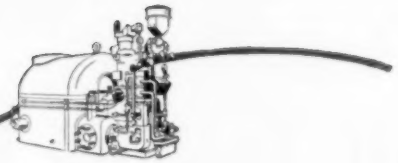
GULF OIL CORPORATION · GULF REFINING COMPANY

GULF BUILDING, PITTSBURGH, PA.

Sales Offices - Warehouses

Located in principal cities and towns throughout Gulf's marketing territory

GULF INDUSTRIAL LUBRICATION



Positive Safety

when Engines, Turbines

or Compressors Overspeed

GOLDEN-ANDERSON

throttle and automatic

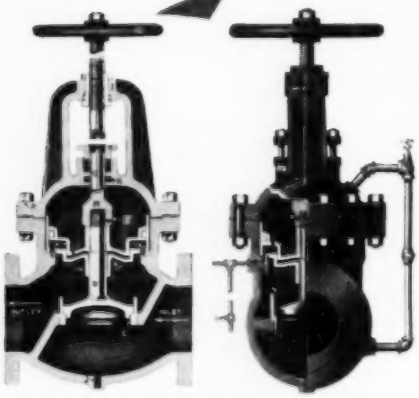
engine stop

Valves

MECHANICALLY OR ELECTRICALLY TRIPPED

Golden-Anderson Throttle and Automatic Engine Stop Valves assure automatic shut-down and protection from damage when turbines, compressors or engines overspeed. A single speed governor trips a pilot control valve directly, or indirectly trips a solenoid-electric pilot control valve which causes this valve to automatically close against inflow pressure. All Golden-Anderson valves are cushioned by the "Double-Corliss" dashpot assembly to prevent banging and chatter.

Write for technical data.



G-A combined throttle and automatic engine stop valve, globe pattern.

GOLDEN-ANDERSON *Valve* SPECIALTY COMPANY

2073 KEENAN BUILDING · PITTSBURGH 22, PA.

LIFE AND PROPERTY PROTECTION
VALVES SINCE 1905

The most resounding compliment an operating man can pay a sales engineer is contained in those simple words. When you say "he knows his way around" you mean in no uncertain terms that someone has gotten right down to business and wiped out one of your problems.

Those words are the sweetest music that comes to our ears when we go into a plant and show an operating man the straight, low-cost route to a complete solution of his water conditioning problem. Thousands have said it of the Elgin organization; you will say it too . . . and we'll tell you why:

Elgin knows its way around because we have tusseled with just about every conceivable water conditioning problem . . . because we have explored every method that can be properly applied to any problem . . . because we have available every authoritative method.

Unlike the man who deals with only one or two methods, the Elgin man can select the *best* method from all methods. That's why he can choose the method that fits your condition, instead of trying to convince you that your condition fits *his* method! There is no cost or obligation whatever for a complete check-up of your conditions and a concrete recommendation from the organization that is so widely acknowledged to know its way around. Write today for facts about an Elgin survey.

ELGIN SOFTENER CORPORATION
132 N. Grove Ave., Elgin, Ill.

ELGIN
ECONOMICAL WATER CONDITIONING

Up to 44% more soft water per regeneration—from the same size softener using same type of zeolite

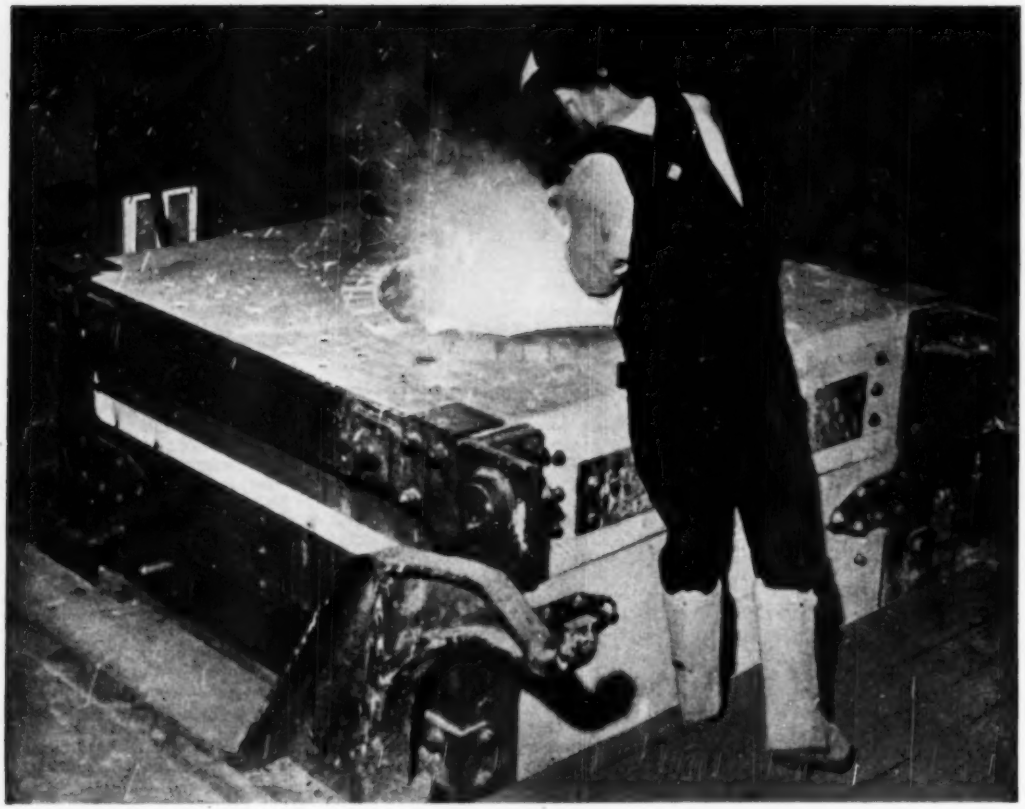
There you have the proof that Elgin knows its way around in the zeolite water softening field, just as in the fields of chemical treatments, filters, purifiers, and other water conditioning methods and equipment.

The open secret of this greater, zero-soft water output is the Elgin "Double-Check" manifold design which prevents escape of zeolite; thus permits using more zeolite in a tank of given size. Prevention of zeolite loss also permits faster, more thorough back-washing. Over-all result is more soft water, from a smaller softener, at lower cost.

The "Double-Check" system can also be installed in existing softeners (of any make) with these same remarkable results.

Other Elgin water conditioning methods and equipment include:

- Boiler feed water treatments
- Post treatments for softened water
- Corrosion prevention in steam systems
- Corrosion prevention in hot and cold water piping
- Filters and purifiers
- Boiler sludge removal (Deconcentrator) systems
- Iron removal equipment
- Aerators and Degasifiers
- Chemical feeders
- Water testing equipment
- Zeolites of all types



For Melting Non-ferrous Metals In Any Furnace--

--NORTON Refractory Cements

For melting all non-ferrous metals — in high frequency and induction furnaces, pit furnaces, direct arc type rocking furnaces — Norton Company offers a complete line of high temperature cements and prefired shapes. **Fused magnesia cements** for lining Ajax-Northrup high frequency furnaces melting nickel-chromium alloys; **silicon carbide mixtures** for ramming into oil or gas fired reverberatory and pit furnaces melting aluminum, copper and zinc; **fused alumina cements** for lining burner tunnels in gas or oil fired billet heating, heat treating and annealing furnaces; **fused magnesia cement** for rammed linings in Ajax-Wyatt low frequency vertical ring induction furnaces melting high copper alloys, and cupro-nickel, nickel-silver and cadmium-bronze alloys.

NORTON REFRACTORIES

NORTON COMPANY
WORCESTER 6, MASSACHUSETTS

Straight-Flow Port Design reduces fluid turbulence to a practical minimum.

...eat Rings of end-seated type ...re screwed into the body.

Sure-Grip Malleable Handwheel for non-skid gripping even with heavy gloves.

WALWORTH

iron body gate valves

with screwed or flanged ends

... 8 Outstanding Features

For complete information on these new Walworth Iron Body Valves, see your local Walworth distributor, or write for bulletin 106.

Brass Liner on Glands assures greater resistance to corrosion and scoring.

WALWORTH

valves and fittings

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DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

T-head Disc-to-Stem connection on OS&Y types provides stronger connection, prevents loosening of disc by corrosion.

Bronze Back-Seat Bushings in bonnets of OS&Y valves.

Solid Web Type Disc in OS&Y valves for greater strength and longer service.

Hinged Gland Eye-Bolts on OS&Y valves permit faster, easier repacking under full pressure.

UNSURPASSED FIRE PROTECTION FOR COMMERCIAL AND INDUSTRIAL RISKS

UNDERWRITERS' APPROVED PEERLESS FIRE PUMPS

HORIZONTAL CENTRIFUGAL AND VERTICAL TURBINE TYPES—Peerless Underwriters' Approved Fire Pumps can be applied to practically every commercial and industrial risk requiring fire protection. They afford dependable, low cost protection, peak quality performance and unquestioned reliability that often will result in measurable savings in insurance cost.

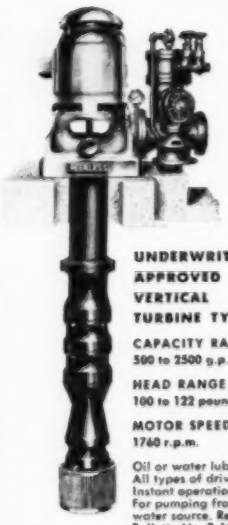
SINGLE AND MULTI-STAGE—Peerless Underwriters' Approved Fire Pumps are available in two types. The Type AF, shown above, is a single stage, double suction, horizontal centrifugal design, with a capacity range of from 500 to 2000 g.p.m., affording pressures, at rated capacities, from 40 to 150 lbs. and is available in 4", 5", 6" and 8" discharge sizes.

The Type TUF is a 2-stage pump available in 4", 5", 6" or 8" discharge sizes and furnishes from 500 to 1500 g.p.m., with a pressure range, at rated capacities, from 100 to 200 lbs.

ALL TYPES OF APPROVED DRIVES—Peerless approved fire pumps may be equipped with any type of drive: electric, steam turbine, gasoline or diesel engine. Auxiliary stand-by engine drives may be used in conjunction with turbine or motor drive to assure instant service even in the event of power failure.

SPRINKLER AND FOAM SYSTEMS—Peerless Underwriters' Approved Fire Pumps are ideal for application to liquid-foam type fire protection systems as well as to conventional sprinkler application; the former is especially desirable for solvent processing plant protection where the split-second control of fire hazards is a must.

NEW 24-PAGE BULLETIN ANSWERS ALL QUESTIONS ON UNDERWRITERS' FIRE PUMPS—Peerless Bulletin No. B-1500 completely describes and illustrates these unsurpassed and approved fire protection pumps. Write for your free copy today.



UNDERWRITERS' APPROVED VERTICAL TURBINE TYPES

CAPACITY RANGE: 500 to 2500 g.p.m.

HEAD RANGE: 100 to 122 pounds.

MOTOR SPEEDS: 1760 r.p.m.

Oil or water lubricated. All types of drives. Instant operation. For pumping from any water source. Request Bulletin No. B-152-1.

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Factories: Los Angeles, California, and Indianapolis, Indiana
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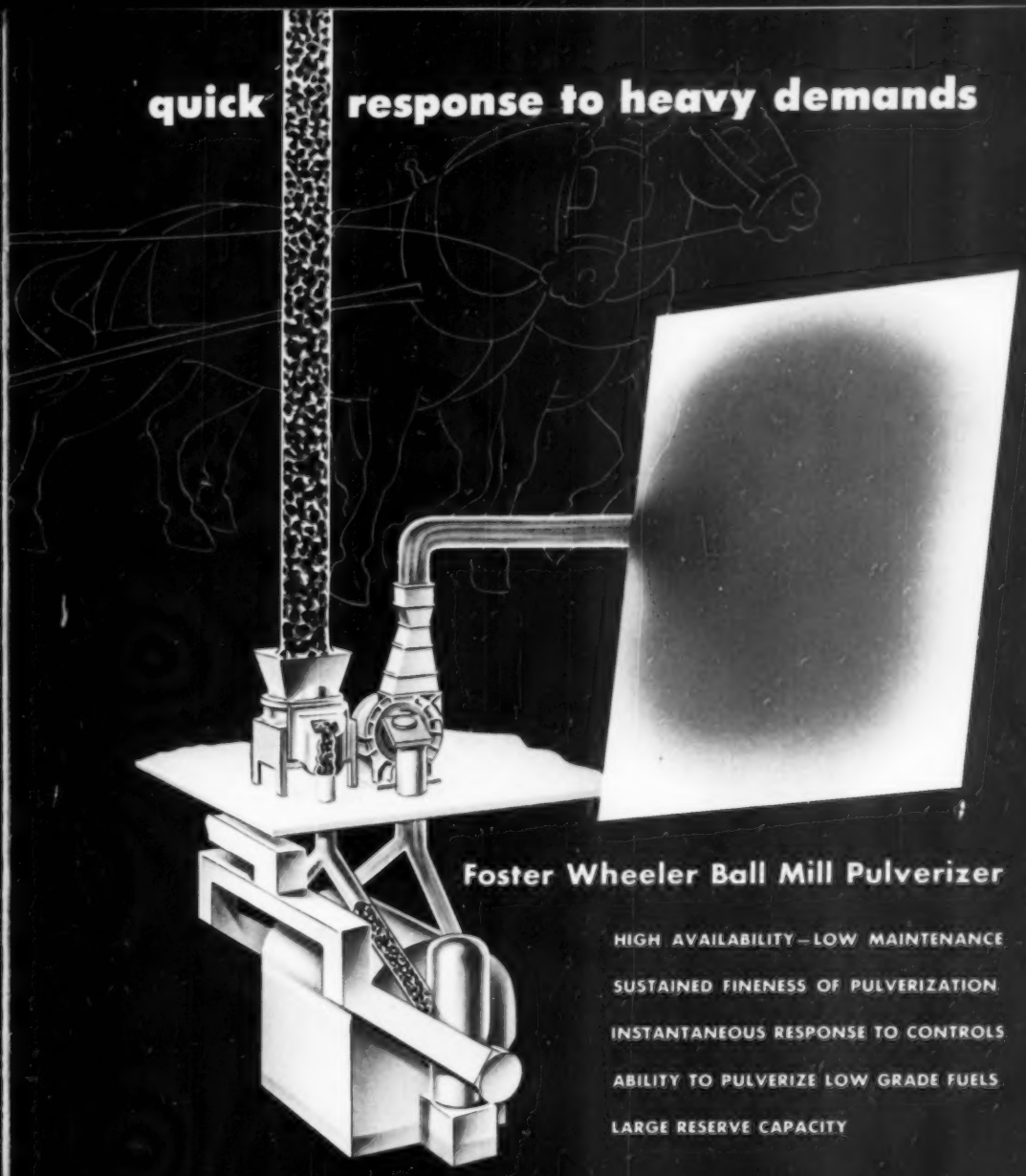
quick response to heavy demands



Foster Wheeler Ball Mill Pulverizer

HIGH AVAILABILITY—LOW MAINTENANCE

SUSTAINED FINENESS OF PULVERIZATION

INSTANTANEOUS RESPONSE TO CONTROLS

ABILITY TO PULVERIZE LOW GRADE FUELS

LARGE RESERVE CAPACITY

The basic qualities of dependability, responsiveness, and capacity for hard work . . . as symbolized by the prize workhorse . . . are also desirable in modern machinery. But it is the added element — *skilled engineering* — that removes us so distantly from the horse age and makes it possible to build machinery like the Foster Wheeler Ball Mill Pulverizer which pulverizes as much as 30 to 40 tons of coal per hour with instantaneous response to load demands.

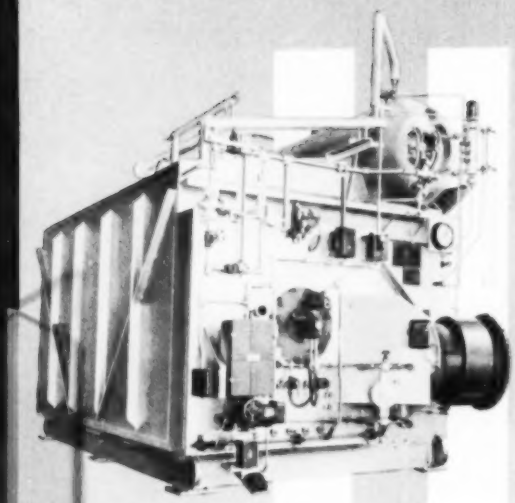
For further information write to:

FOSTER WHEELER CORPORATION • 165 BROADWAY, NEW YORK 6, N. Y.

FOSTER WHEELER

a small unit with a great background

FOSTER WHEELER PACKAGE STEAM GENERATORS



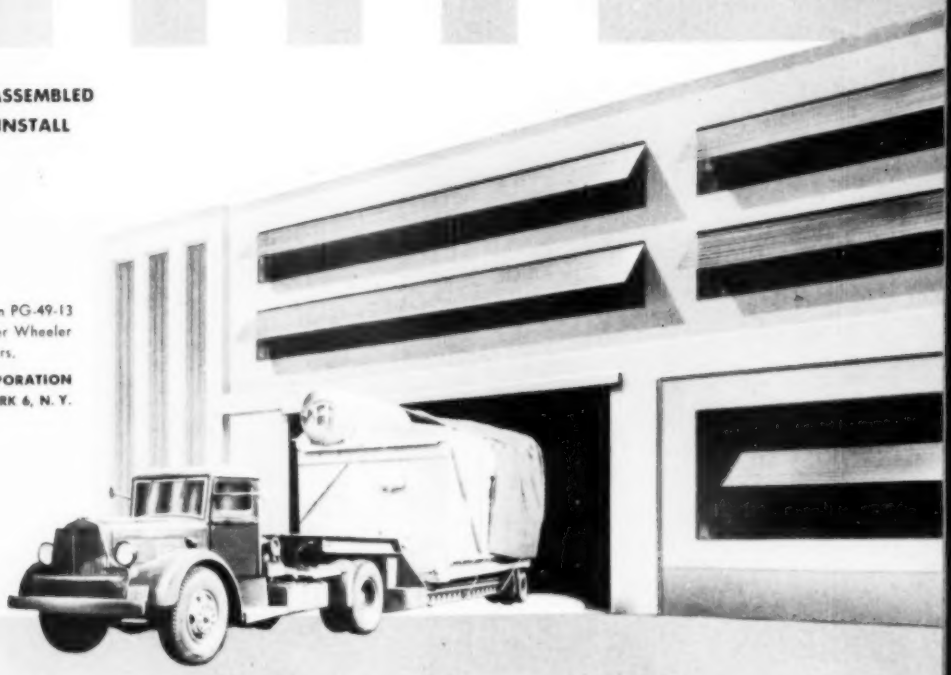
water-tube units embodying the best features of central station and industrial steam plants

The average boiler horsepower per unit of 15,000 installations which were surveyed recently lies between 150 to 175 hp. These units were found to be operating at extremely low efficiencies with poorly coordinated equipment. There was also evidence that erection had been done by unskilled or semiskilled labor.

Could one of these installations be yours?

Provide for your present and future steam plant requirements by installing a scientifically integrated Foster Wheeler Package Steam Generator which *insures continuous steam output under widely fluctuating load demands at low cost and with a minimum of maintenance.* Exclusive Foster Wheeler features affecting casing, combustion controls, insulation and general structure are incorporated in this unique package unit.

FACTORY ASSEMBLED
READY TO INSTALL



Write for a copy of Bulletin PG-49-13 covering all types of Foster Wheeler Package Steam Generators.

FOSTER WHEELER CORPORATION
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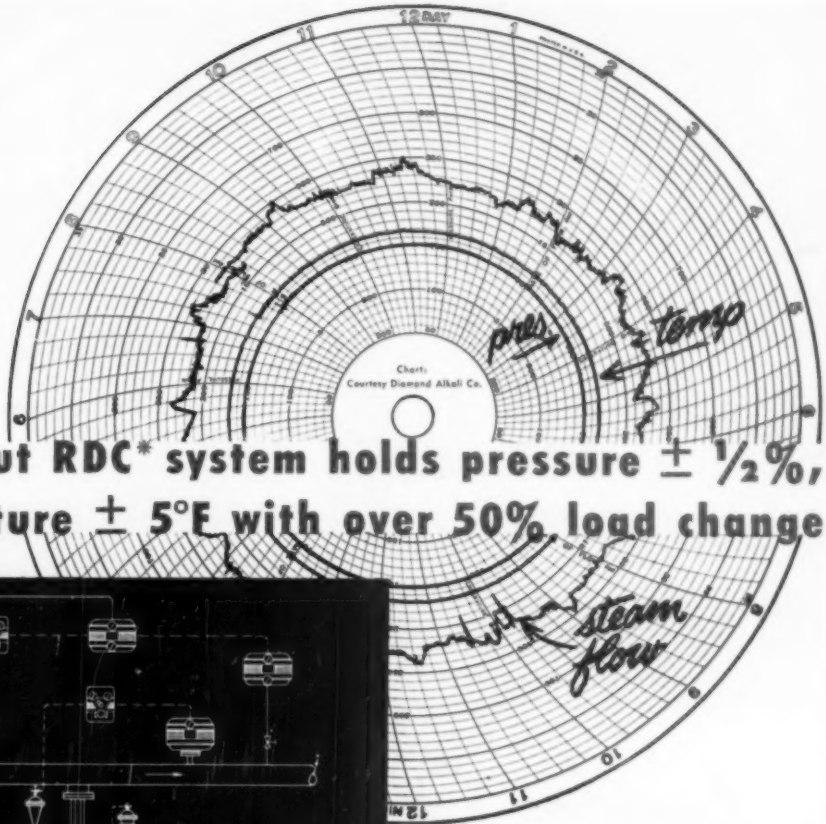
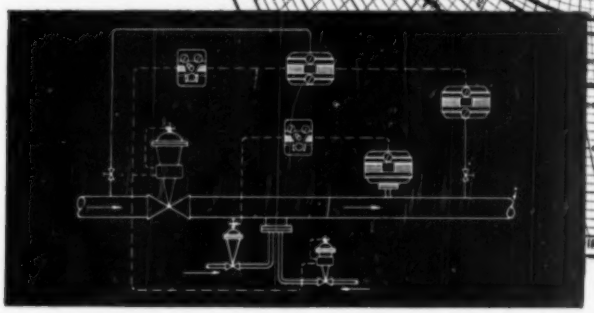


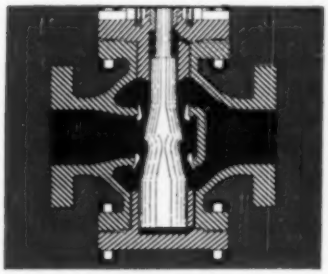
Swartwout RDC* system holds pressure ± ½%, temperature ± 5°F with over 50% load change



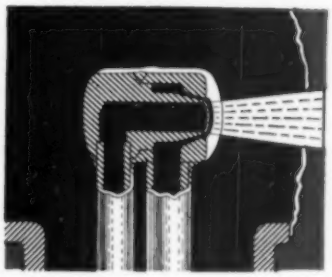
1 **RDC*—Reducing, Desuperheating and Control**—represents a single problem for which Swartwout assumes unit responsibility. Diamond Alkali Co. No. 4 RDC station at Painesville, Ohio, handles 200,000# steam per hour with reduction from 1450 to 152 psi; temperature from 900° to 438°F. Chart above shows the precision control of the Swartwout RDC system.

Swartwout

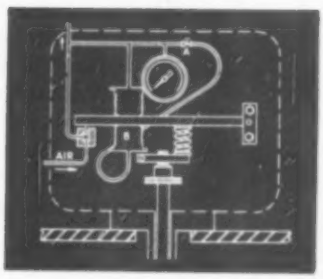
POWER PLANT EQUIPMENT



2 **REDUCING VALVE** for high pressure and temperature applications utilizes rugged construction and larger diameter stem to assure smooth action and long life. Disc and seat contours form nozzle-shaped passages which minimize turbulence and eliminate undue noise and life-shortening vibration.

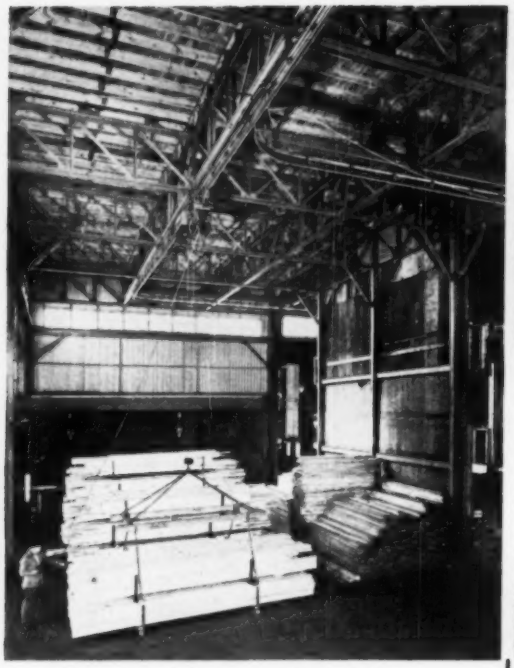


3 **STEAM ATOMIZING** desuperheater has nozzle in center of steam line for effective narrow-angle dispersion of completely atomized water. Nozzle is accurately machined for each installation to give high velocity with existing atomizing steam pressure. Swartwout also makes carburetor and mechanical atomizing types.

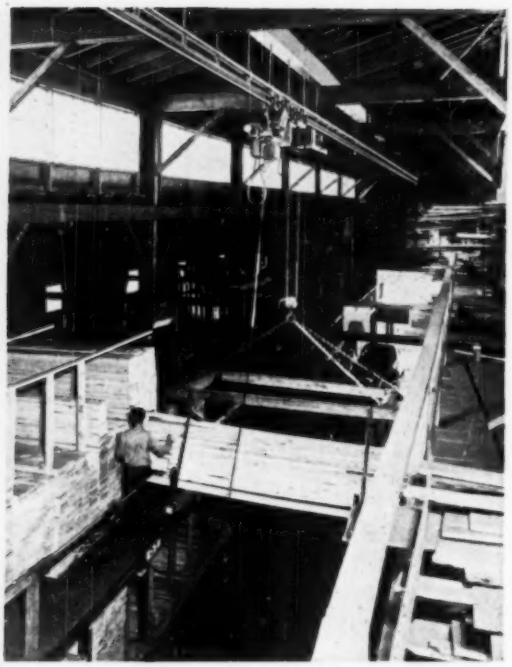


4 **TEMPERATURE CONTROL** combines wide throttling range with automatic load compensation for close temperature control. Needle valve A adjusts rate of flow to and from reset bellows B, establishing load compensating characteristic. Operation is stable regardless of load change and time lag. A-2512

SEND FOR BULLETINS S-21-E, S-22-C, S-199. THE SWARTWOUT COMPANY, 10511 EUCLID AVENUE, CLEVELAND 12, OHIO



Unloading pallets of random length lumber.



Pallets transferred to 3-level storage.

Lumber Storage Labor Cost

CUT IN HALF

Due to three storage levels in this lumber warehouse, normal requirements would necessitate 4 men. With the American MonoRail System only 2 men are required to handle pallets from unloading dock to storage . . . labor cost on this operation is cut in half. This is just another of the hundreds upon hundreds of cases where American MonoRail Overhead Handling Systems cut cost of materials handling. Your American Monorail engineer can show you how it will effect savings in your plant.

SEND FOR BULLETIN C-1, a 56-page book showing successful applications of American MonoRail Systems.

THE AMERICAN MONORAIL COMPANY

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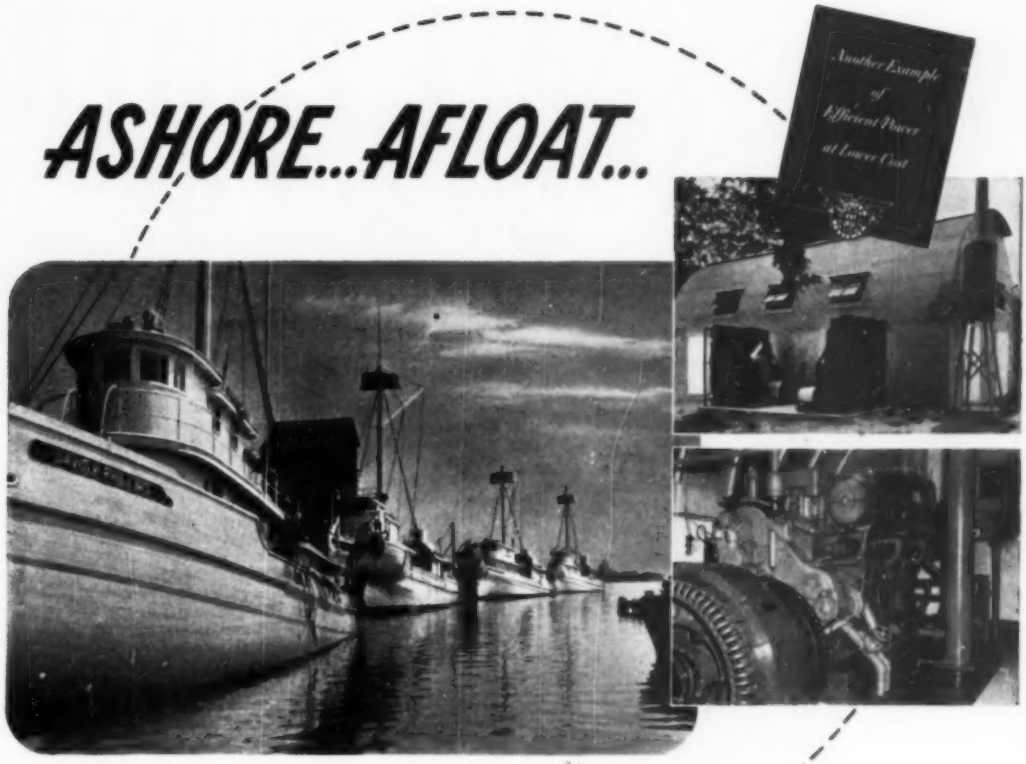
ASHORE...AFLOAT...



it's Cooper-Bessemer 100%

for 2-way savings at Reedville Oil & Guano Co.

This company's fish reduction plant, where 50 tons of Menhaden can be processed per hour, is now completely powered by its own diesel-electric power plant. The prime mover is a Cooper-Bessemer diesel, preferred largely because of the outstanding performance of Cooper-Bessemer marine diesels in the company's four large Menhaden boats shown above.

The fact that each of these boats was converted from steam to Cooper-Bessemer diesel propulsion over a period of years speaks for itself — evidences the high efficiency and over-all operating economy of these lusty engines. Similarly, the stationary Cooper-Bessemer in shore service will soon pay for itself in reduced power costs.

For low-cost diesel power at its best, stationary, marine or locomotive, you'll be wise to check with Cooper-Bessemer.

Above, left: "David E. Phillips", "Margaret", "Alden S. Swan" and "William S. Brunster", 125' to 130' over-all, all repowered from 1944 to 1947 with Cooper-Bessemer direct-reversing diesels ranging from 515 to 730 bhp.

Above, right: Exterior and interior view of diesel-electric plant, powered by a supercharged Cooper-Bessemer 885 hp 15-6 diesel driving a 600 kw Elliot generator. Radiators adjacent to power house cool engine jacket water and water for lube oil cooler.

The **Cooper-Bessemer** Corporation

MOUNT VERNON, OHIO — GROVE CITY, PENNA.

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San Francisco, Calif. Houston, Dallas, Greggton, Pampa and Odessa, Texas
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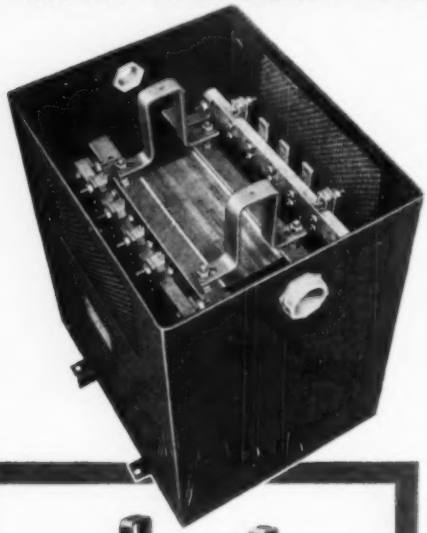
WAGNER TRANSFORMERS
...The choice of leaders in industry

SAFE POWER

Low Cost, too-

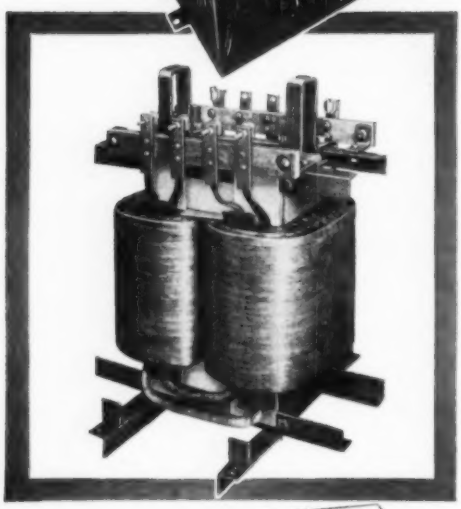
WITH Wagner DRY-TYPE TRANSFORMERS

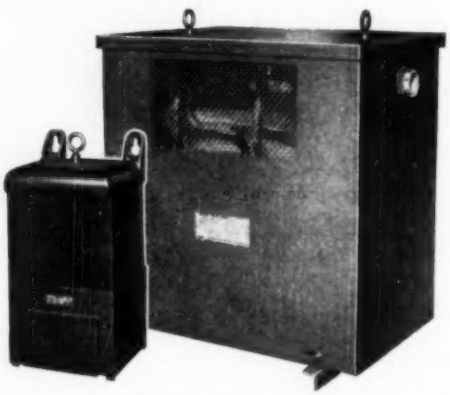


The safest, most economical and efficient way to reduce power distribution costs and to put the right voltage in the right place is to install Wagner dry-type transformers. They provide steady voltage with minimum line losses. They do not require the construction of fire-proof vaults — even in locations where fire hazards are present. They are compact and light in weight — easy to install and easy to move when changes are necessary.

The typical AE, 15 to 100 kva transformer, pictured with core and coils at left, is cased in sheet steel with an easily removable cover. It is equipped with high and low voltage terminals to which incoming leads are connected, utilizing solderless connectors provided for that purpose. High and low voltage external connections are eliminated since ample space and suitable provisions are made for connecting leads inside the transformer.

Twenty-nine branches, located in principal cities, are at your service for consultation on your transformer problems and offer speedy, nationwide service facilities. For full information on Wagner Power and Distribution Transformers, write for Bulletins TU-180 and TU-181.





General purpose dry-type transformers are available in ratings from ¼ to 200 kva, 600 volts and below, single-phase, two coil, Type AE; and from 3 to 300 kva, 600 volts and below, three-phase, two coil, Type AP. Type AA auto-transformers are also available.

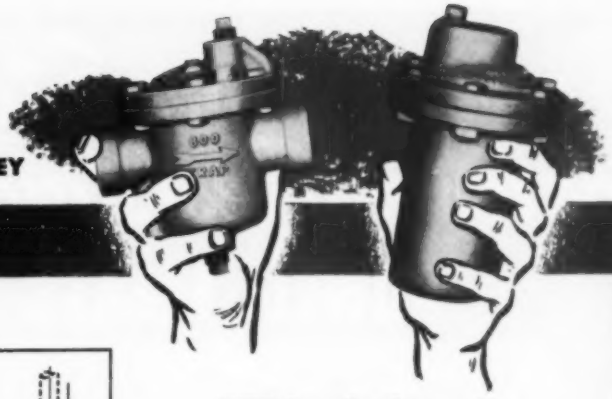
WAGNER ELECTRIC CORPORATION
6383 Plymouth Ave., St. Louis 14, Mo., U.S.A.

Wagner Electric Corporation
EST. 1891

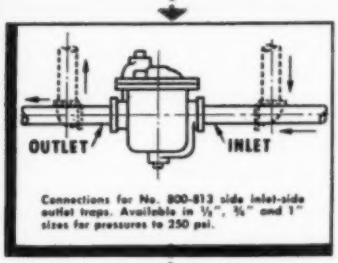
ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

BRANCHES IN 29 PRINCIPAL CITIES

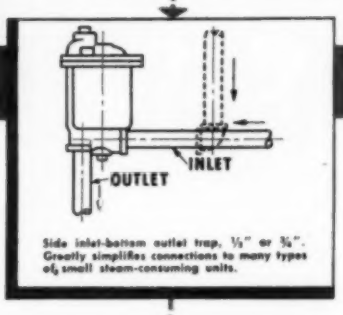
YOU SAVE TIME AND MONEY



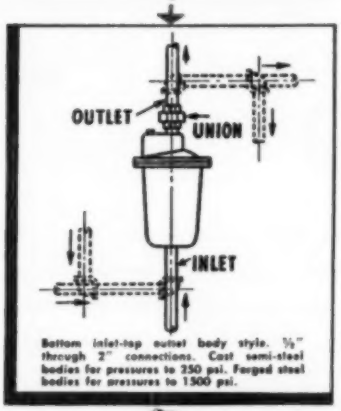
"This choice of Steam Trap Body Styles simplifies installations"



Connections for No. 800-813 side inlet-side outlet traps. Available in ⅛", ¼" and ⅜" sizes for pressures to 250 psi.



Side inlet-bottom outlet trap, ⅛" or ¼". Greatly simplifies connections to many types of small steam-consuming units.



Bottom inlet-top outlet body style. ⅛" through 2" connections. Cast semi-steel bodies for pressures to 250 psi. Forged steel bodies for pressures to 1500 psi.

IN THE most widely used sizes, Armstrong Steam Traps are available in either side inlet-side outlet or bottom inlet-top outlet body styles. This gives the user an opportunity to make exceptionally neat installations with a minimum of fittings and a minimum of labor and permits correct location of the trap in relation to the unit being drained.

In both styles the entire interior mechanism may be taken out for inspection or repair simply by removing the cap. The body, full of boiling water, is left in the line. In the case of the side inlet trap the cap may be removed without even disturbing the pipe connections.

Ask your nearby Armstrong representative to show you the opportunities for simplifying trap installations.

ARMSTRONG MACHINE WORKS
806 Maple St., Three Rivers, Mich.

THE 36-PAGE ARMSTRONG STEAM TRAP BOOK gives data and prices on the complete line of Armstrong steam traps for every pressure, every application. This book is a valuable reference for the calculation of condensate loads and the selection of traps for all classes of equipment. Send for free copy today

ARMSTRONG STEAM TRAPS

Bronze, Iron, Steel and Corrosion-Resisting Valves-

POWELL MAKES THEM ALL!

Fig. 3031 W. E.—Class 300-pound Cast Steel Globe Valve with welding ends, outside screw rising stem and bolted flanged yoke.

Fig. 241 — Large 125-pound Iron Body Bronze Mounted Globe Valve. Outside screw rising stem, bolted flanged yoke, regrindable, renewable bronze seat and disc.

When you come to ONE SOURCE, you simplify your valve buying—and stocking of spare valves and parts—for your entire flow control system.

Powell Bronze, Iron, and Steel Valves are second to none in giving long, trouble-free service. And when it comes to Special Design and Alloy Valves for Corrosion Resistance, Powell is the acknowledged leader. In fact, Powell makes the *only* COMPLETE line of these valves available to Industry today.

Fig. 1708 — 200-pound Bronze Globe Valve with screwed ends, union bonnet, renewable specially heat treated stainless steel seat and regrindable, renewable "Powellium" nickel-bronze disc.

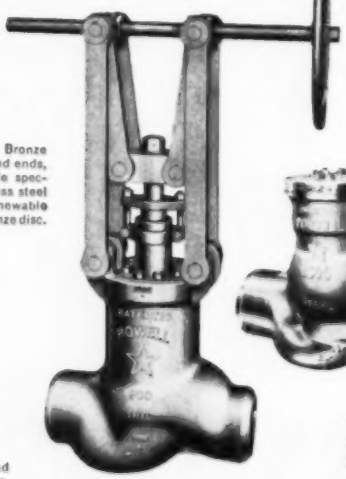


Fig. 1314-A — Class 1500-pound Steel Integral Bonnet "Y" Valve with welding ends. Also available in Globe and Angle patterns.

Fig. 11365 W. E. — Class 1500-pound Cast Steel Pressure Seal, Piston Guided, Horizontal Lift Check Valve with welding ends. Streamline design permits maximum flow through the valve with minimum pressure drop.

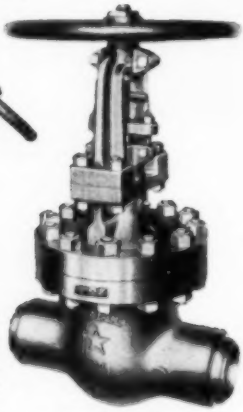


Fig. 9003 W. E.—Class 900-pound Cast Steel Gate Valve. Welding ends, outside screw rising stem, bolted flanged yoke, tapered solid wedge.

Fig. 375 — 200-pound Bronze Gate Valve. Screwed ends, union bonnet, inside screw rising stem and renewable "Powellium" wear-resisting nickel-bronze disc.

Fig. 19084 W. E. — Class 900-pound Cast Steel Pressure Seal Globe Non-Return Valve with welding ends and toggle operation. Improved streamline design reduces pressure drop and turbulence to the minimum.

The Complete Powell Line includes Globe, Angle, "Y", Gate, Check, Non-return, Relief, and Flush Bottom Tank Valves in Bronze, Iron, Steel and a wide range of Corrosion-resistant metals and alloys.

Ask your nearest Distributor—or write direct

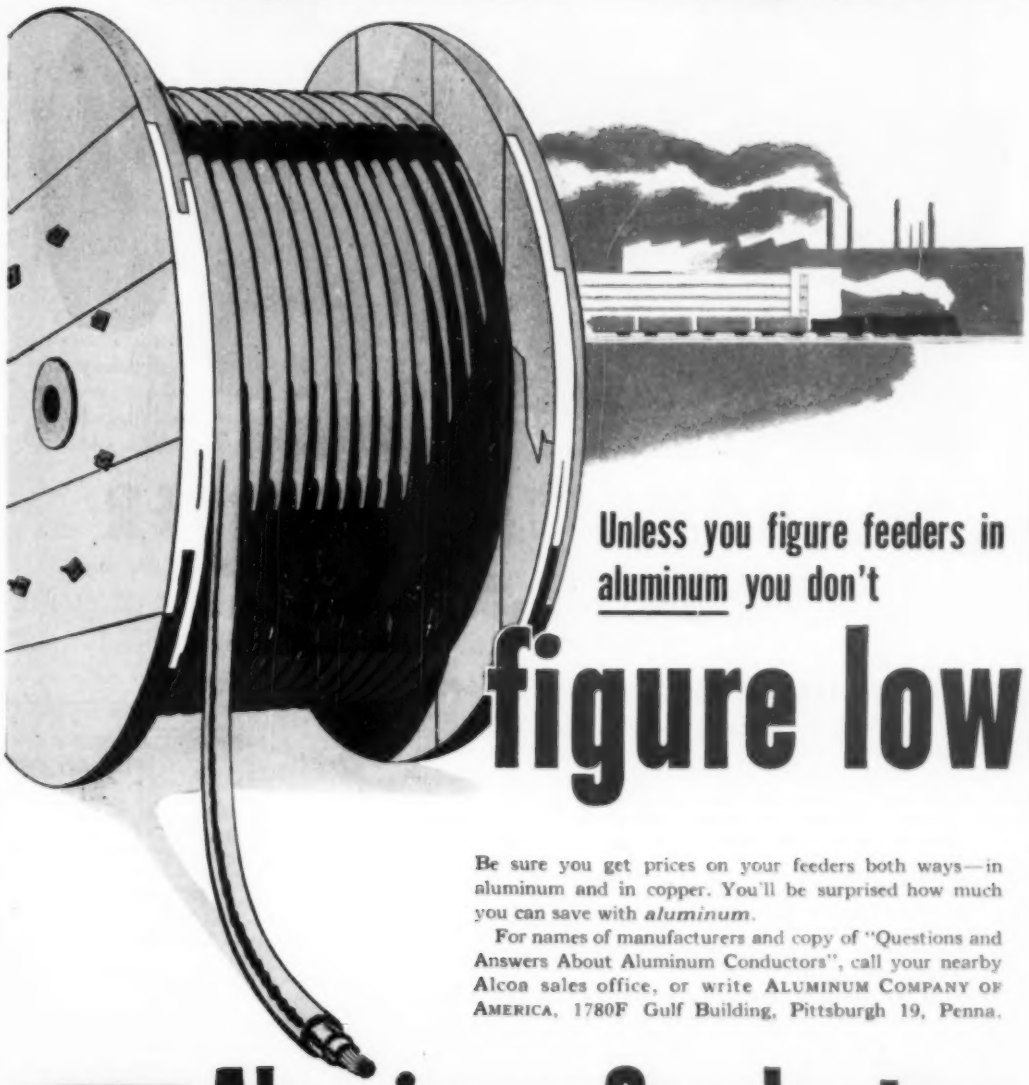
The Wm. Powell Co., Cincinnati 22, Ohio

DISTRIBUTORS AND STOCKS IN ALL PRINCIPAL CITIES

POWELL VALVES

Wiring for

heavier loads?



Unless you figure feeders in aluminum you don't

figure low

Be sure you get prices on your feeders both ways—in aluminum and in copper. You'll be surprised how much you can save with *aluminum*.

For names of manufacturers and copy of "Questions and Answers About Aluminum Conductors", call your nearby Alcoa sales office, or write ALUMINUM COMPANY OF AMERICA, 1780F Gulf Building, Pittsburgh 19, Penna.

Insulated

Aluminum Conductors

ALCOA

of ALCOA EC ALUMINUM are made by leading manufacturers

...Use HOMESTEAD-REISER

FULL PORT Self-Seald LUBRICATED PLUG VALVES

. . . the Lowest Priced, Full-Port-Area Plug Valves In Their Rated Working Class

If you're using a venturi (restricted-port-area) valve with an opening of say, 60% standard pipe area, you are operating at reduced line pressure. To be sure of nearly full line pressure, you must use a larger size venturi, which of course means a higher priced valve . . . perhaps as much as 30% higher!

For example: **A 2½" Homestead-Reiser has a 100% full-port-area, or 4.78 sq. in. The 2½" size in 60% venturi pattern has only 2.87 sq. in. port area. To approximate the full-port-area of a 2½" Homestead-Reiser valve, a 3" venturi must be used. And even then you'll have less than Homestead-Reiser's full-port-area.**

In the light of this evidence doesn't it stand to reason that Homestead-Reisers with their 100% full-port-area are sound economy?

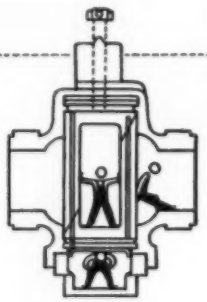
Truly, from the standpoint of both first cost and length of service, they are the lowest priced, full-port-area lubricated plug valves in their rated working class!

For complete information, write for Catalog 39, Section 5. We'll mail it to you promptly.

HOMESTEAD VALVE MANUFACTURING CO.

"Serving Since 1892"

P. O. Box 70 Coraopolis, Pa.



"SELF-SEALD" MEANS

. . . that in addition to a full-port lubricant seal the wedge-action of the plug under line pressure, forces the finished surfaces of the plug outward and constantly presses them against the seating surfaces of the body, thus keeping them always in intimate contact. The plug automatically adjusts itself for wear, assuring extra long life, maximum leakless service and lubricant economy.

You can be sure when a **B&W Refractories Engineer** *recommends boiler refractories*

If you are having trouble with boiler furnace linings . . . if they are causing high maintenance costs and excessive outages . . . consult your B&W Refractories representative. He understands your problems . . . knows their solutions . . . And he can make expert recommendations from B&W's *complete* line of refractories:

HEAVY FIREBRICK

For furnaces with slagging, flame impingement and spalling conditions, either B&W 80 or Junior Firebrick can be used. 80's assure uninterrupted service at extremely high ratings. Juniors are recommended where load bearing and temperature requirements are less severe, but too severe for the best grades of fireclay brick.

INSULATING FIREBRICK

B&W Insulating Firebrick have the lightest weight and lowest heat conductivity of any insulating firebrick in their class. They store and conduct less heat—withstand direct exposure to furnace gases. Available in six types for temperatures from 1600 F to 2900 F.

PLASTICS

Used widely for repairs and for forming special shapes *in place*, B&W *Plastic Moldable* and *B&W Plastic Chrome Ore* offer long life under severe conditions. Plastic Moldable is suitable for use in the great majority of furnaces. It withstands temperatures up to 3000 F. Plastic Chrome Ore is ideally suited for severe slagging conditions.

CASTABLES

In furnaces that require the high resistance of chrome to chemical attack and where speed of installation is important, B&W offers *Kromecast* for temperatures up to 3100 F and *Hydrochrome* for temperatures up to 2800 F.

For burner openings, door linings, walls, roofs and arches, B&W *Kaocast* possesses unusual volume stability and resists spalling. It easily withstands temperatures up to 3000 F.

B&W Baffle Mixes are excellent castables for the construction of monolithic boiler baffles, door linings and other general uses. They are smooth and flow easily, have high strength in small sections. Widely used to withstand temperatures as high as 2600 F.

B&W Insulating Concrete Mixes combine refractoriness, light weight and low heat conductivity with the ability to be poured like ordinary concrete. For temperatures up to 2200 F.

MORTARS

B&W Mortars—Selecting the right mortar is vitally important to long refractory life. B&W Mortars pay for themselves by saving time in application and by satisfactorily performing their jobs under the designed furnace conditions.

For help with a furnace maintenance plan to cut costs and prevent unscheduled outages, call your local B & W Refractories Engineer.

B-371

B&W REFRACTORIES PRODUCTS

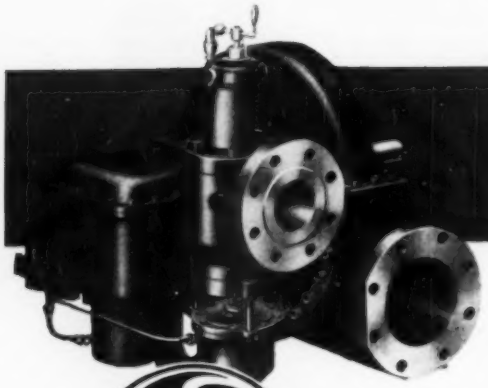
B&W 80 FIREBRICK • B&W JUNIOR FIREBRICK
B&W 80 GLASS TANK BLOCKS • B&W INSULATING FIREBRICK
B&W REFRACTORY CASTABLES, PLASTICS AND MORTARS

OTHER B&W PRODUCTS

Stationary & Marine Boilers and Component Equipment
Chemical Recovery Units . . . Seamless & Welded Tubes . . . Pulverizers
Fuel Burning Equipment . . . Pressure Vessels . . . Alloy Castings

BABCOCK & WILCOX

THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 85 LIBERTY ST., NEW YORK 6, N.Y.
WORKS: AUGUSTA, GA.



SAVE

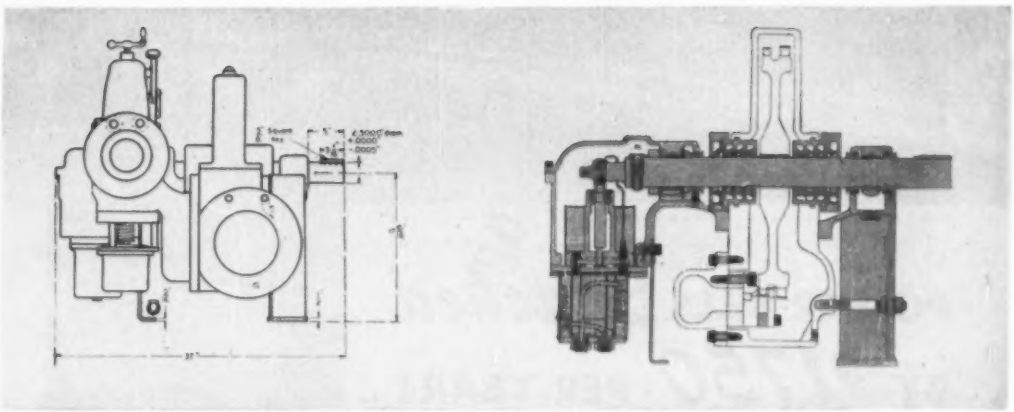
TYPE **DP**

General Electric's DP turbines, available in three frame sizes and a variety of ratings, can be profitably used in many different applications, yet they compose a standard line and incorporate standard parts. This standardization gives you four important benefits:

1 EASY TO STOCK SPARES Because most parts are interchangeable on all models, spares can be stocked at low cost. A spare parts kit, containing 91 items, can be obtained with the turbine. This simple method of stocking spares lowers maintenance costs and provides protection for several DP's in your plant.

FOUR WAYS

WITH Standard Turbines



2 INSTALLATION SIMPLIFIED

All models, regardless of frame size, horsepower, or speed ratings, have identical shaft height, keyways, and coupling fits. Thus, installation problems are simplified, and you can move these center-line supported units from job to job without a "custom line-up."

3 GREATER FLEXIBILITY

As the shaded parts in the diagram illustrate, most DP parts are identical on all frame sizes and ratings. In this way, you can adapt a DP for different job requirements with only minor changes. A different nozzle plate gives you a different horsepower output. A change in governor gears provides a new speed range. When modernization programs demand a change in plant operation, the DP's flexibility will save you money.

4 A BETTER TURBINE

Manufacturing savings from standardization are passed on to you in the form of special features at no extra cost. For instance: hydraulic governing, combined trip-throttle valve, 30% speed range are advantages you'd expect to find only in custom equipment.

Ask your General Electric representative for full details about the DP mechanical-drive turbine or write for bulletin GEA-4955. Get the full details on how standardization will benefit your plant operation. Apparatus Department, General Electric Company, Schenectady 5, N. Y.

GENERAL ELECTRIC

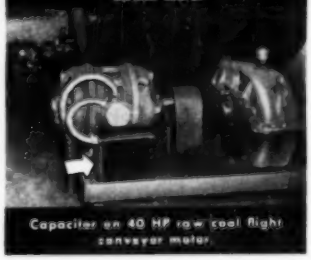
252-45

ANOTHER CASE HISTORY OF
HOW SPRAGUE CAPACITORS
SERVE INDUSTRY

Here is the modern coal cleaning plant and loading tipple of the Elk Lick Coal Co., Jerryville, W. Va.

Capacitor on 3 HP sand elevator motor.

Capacitor on 15 HP dewater screen motor.



Capacitor on 40 HP raw coal flight conveyor motor.

POWER BILLS *Slashed* BY $1750 PER YEAR!

Here's how the management of one enterprising coal company cut its electric power costs simply, easily, and quickly! They installed Sprague Power Factor Correction Capacitors at the source of low power factor—the load!

Not only did this remove excess load from motor circuits and controls, and reduce transformer loading appreciably, but it also earned rate bonuses on the electric power bills.

During the month following installation of Sprague Capacitors, 7.8% more kilowatt-hours of energy were used yet the power bill was 6.4% less. This saving was possible because of the decrease in demand charges as a direct result of the capacitor installation. The investment in capacitors will be returned in a year's time.

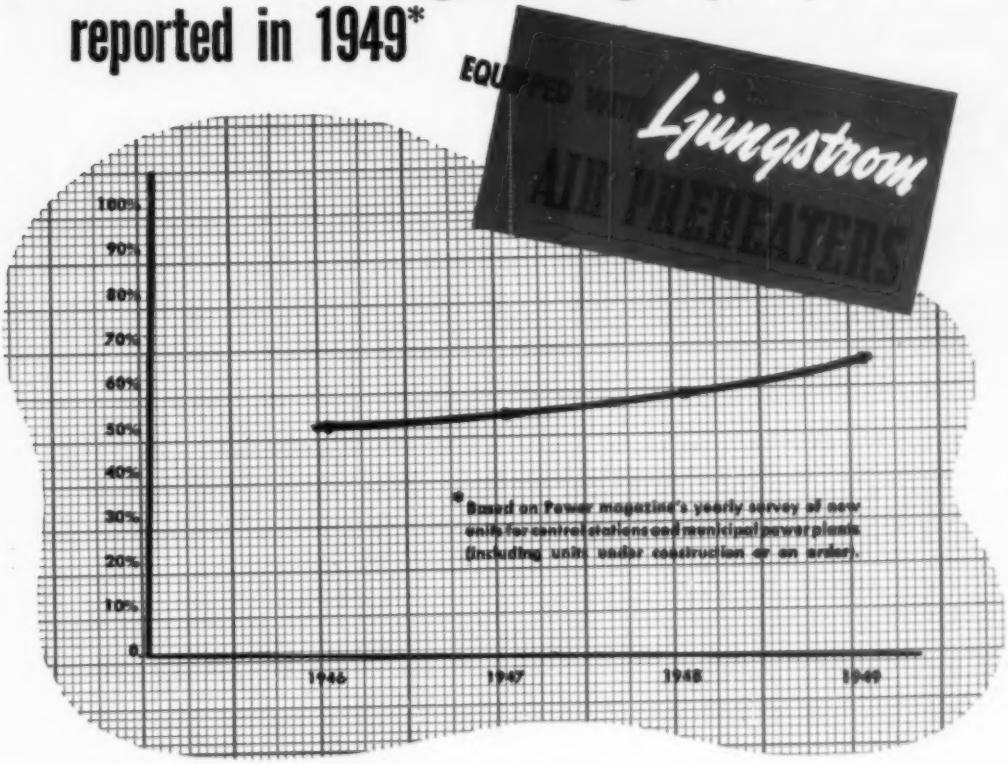
You too can effect savings in power bills and reduce circuit and transformer loads. Let us survey your plant and show you how . . . AT NO COST TO YOU. Write for details today.

SPRAGUE

SPRAGUE ELECTRIC COMPANY
North Adams, Massachusetts

PIONEERS IN
ELECTRIC AND ELECTRONIC DEVELOPMENT

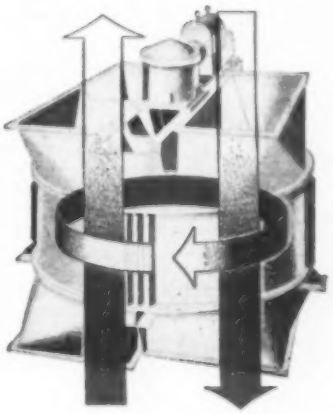
Over 65% of steam generating capacity reported in 1949*



Again in 1949 utilities continued to register an increasing preference for the Ljungstrom regenerative air preheaters. Over 65% of the steam generating capacity for central stations and municipal power plants (including units under construction or on order) reported in Power magazine's 1949 Modern Plant Survey will be equipped with Ljungstrom air preheaters.

The reasons behind this wide acceptance of the Ljungstrom, the only regenerative type air preheater, are sound and simple:

1. High Heat Recovery: The Ljungstrom air preheater, by employing the continuous regenerative counterflow principle, assures the highest practical heat recovery, up to 70% of the total heat in the stack gases.
2. Low Operating Costs: The regenerative principle provides accurate control of metal temperature throughout the entire unit. This permits operation with low maintenance costs, under conditions which would cause rapid deterioration in other designs.
3. Reliability: The high availability of the Ljungstrom air preheaters with all types of boilers, under every condition of operation, is a matter of record in power plants throughout the country.



The Ljungstrom operates on the continuous regenerative counterflow principle. The heat transfer surfaces in the rotor act as heat accumulators. As the rotor revolves the heat is transferred from the waste gases to the incoming cold air.

THE AIR PREHEATER
60 EAST 42d STREET • NEW YORK 17, NEW YORK
CORPORATION

Here's economical standardization on your 125 lb. bronze valve requirements

IN THIS LINE OF VALVES you'll find just what you need to take care of your requirements for 125 lb. service. And you'll also get the inherent values that go into the design and manufacture of every Lunkenheimer product . . . the finest of materials, metallurgically tested and approved; sound engineering design; perfect alignment of parts; meticulous accuracy; craftsmanship guaranteed by skill and ripe experience; the most modern equipment to produce better, and ever better products.

It is the balanced combination of all these factors that has made Lunkenheimer the synonym of highest valve quality, and your guarantee of lowest valve cost per dollar invested.

Give any Lunkenheimer valve a chance to prove itself in service. Once installed, it will quickly demonstrate real economy. Its performance, under all conditions, will be a firm recommendation for your complete standardization on Lunkenheimer . . . and the solution of your valve problems.

Want more information on these fine 125 lb. valves? Ask your distributor for Circulars 566 and 582—or write us direct.

ESTABLISHED 1862

THE LUNKENHEIMER CO.

"QUALITY"

CINCINNATI 14, OHIO, U.S.A.

NEW YORK 13 • CHICAGO 6 • BOSTON 10 • PHILADELPHIA 34

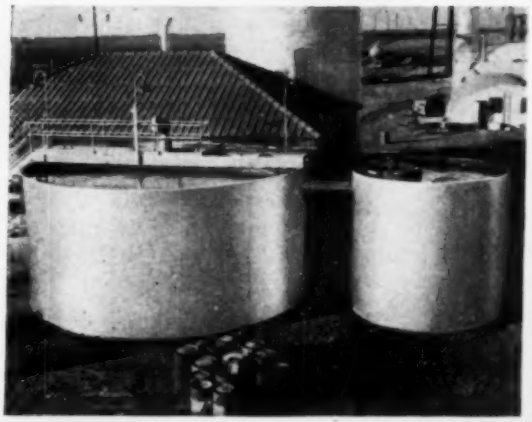
EXPORT DEPT., CINCINNATI 14, OHIO, U.S.A.

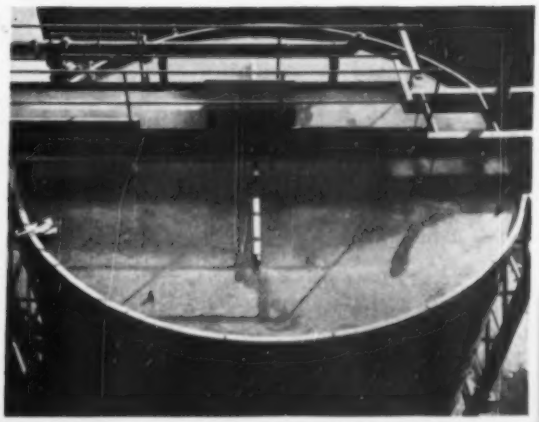
Your Lunkenheimer Distributor

is stocking these 125 lb. S. P. Bronze Valves. Call upon him for your original equipment, replacement and repair valve requirements.

COCHRANE •Sludge• Contact REACTORS

ECONOMICAL REMOVAL OF IMPURITIES FROM INDUSTRIAL WATER SUPPLIES—TURBIDITY, COLOR, HARDNESS—REMOVAL OF SUSPENDED SOLIDS FROM WASTE





COCHRANE'S recognized authority in the field of water conditioning is exemplified in the relatively new field of water clarification by flocculation, in the improved Cochrane Sludge Contact Reactor. This equipment is meeting with pronounced success wherever it has been installed.

The Cochrane Sludge Contact Reactor is distinguished by the fact that the sludge bed is always in suspension, so that the sludge is always present when chemicals and water react.

This is important, in that the precipitates or sludge must not be allowed to settle out on the floor of the tank if maximum clarification or softening is to be obtained. The water as it rises through the sludge bed is both treated and filtered.

Cochrane Sludge Contact Reactors are applicable to

1. Municipal and industrial plants for coagulation and/or softening, removal of turbidity, color, hardness, taste and odor
2. Boiler plants for silica removal
3. Fluoride removal, de-alkalization, iron and manganese removal
4. Paper, textile and other plants for process water—recovery of fibre stock and filler from white water

NEW PUBLICATION AVAILABLE

A new bulletin describing the Cochrane Sludge Contact Reactor, and illustrating different applications is just off the press. A copy will be sent on request.

COCHRANE CORPORATION, 17th St. & Allegheny Ave., PHILADELPHIA 32, PA.

In Canada: Canadian General Electric Co., Ltd., Toronto • In Mexico: Babcock & Wilcox de Mexico S. A., Mexico City

COCHRANE

87 YEARS OF SERVICE

COCHRANE CORPORATION
3110 N. 17th Street, Philadelphia 32, Pa.

Please send me a copy of Publication No. 5001 on Sludge Contact Reactors.

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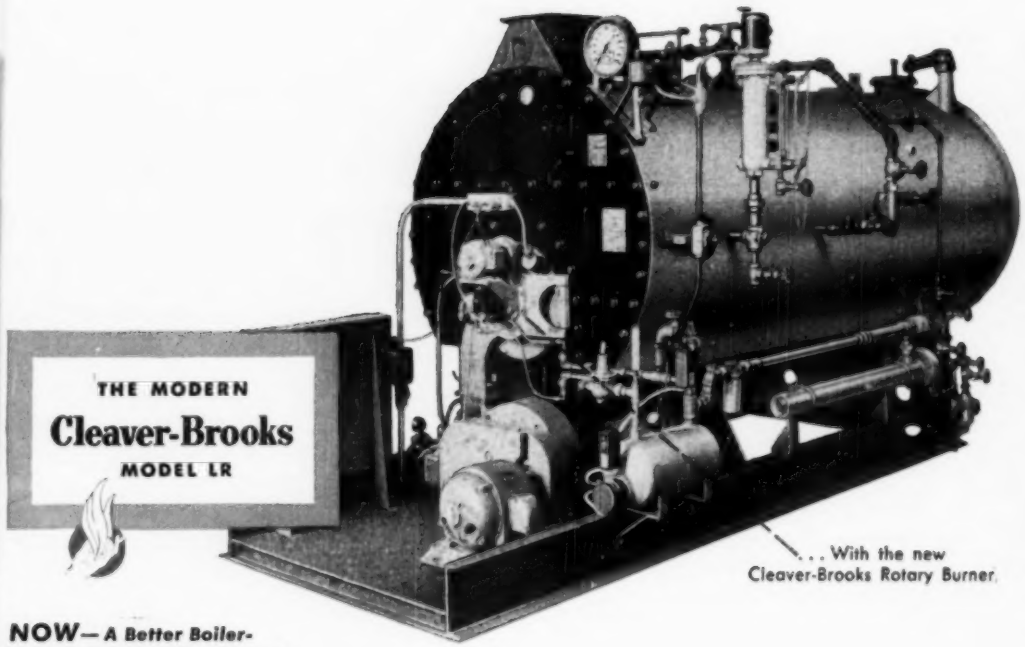
Design

FOR PRODUCING STEAM



. . . With the new Cleaver-Brooks Rotary Burner.

NOW— *A Better Boiler-Burner Unit to Utilize Today's Low-Cost Fuels — Heavy Oil and Gas*

The Cleaver-Brooks Model LR is a "trail-blazer" in modern self-contained boiler design and construction. It makes more effective use of today's low-cost fuels, (heavy oils and gas), and you are assured of better boiler performance.

A Brief List of Notable Features:

— the new Cleaver-Brooks rotary burner — simple — compact — precision machined — perfect mechanical balance — fully automatic — provides unprecedented flexibility in burning heavy fuel oils or industrial gases.

— single low-speed, low-power consumption blower furnishes both primary and secondary air for combustion—less weight and space requirements — reduction in sound levels.

— totally enclosed, drip and dust-proof panel for all major electrical controls.

— electronic combustion safety devices, dual low water cutoffs — are standard equipment.

— simplified design of combination gas-oil burner permits change-over from oil to gas or vice versa in less than a minute.

— improved design of boiler furnace and liberal heating surfaces provide greatest economy with all fuels.

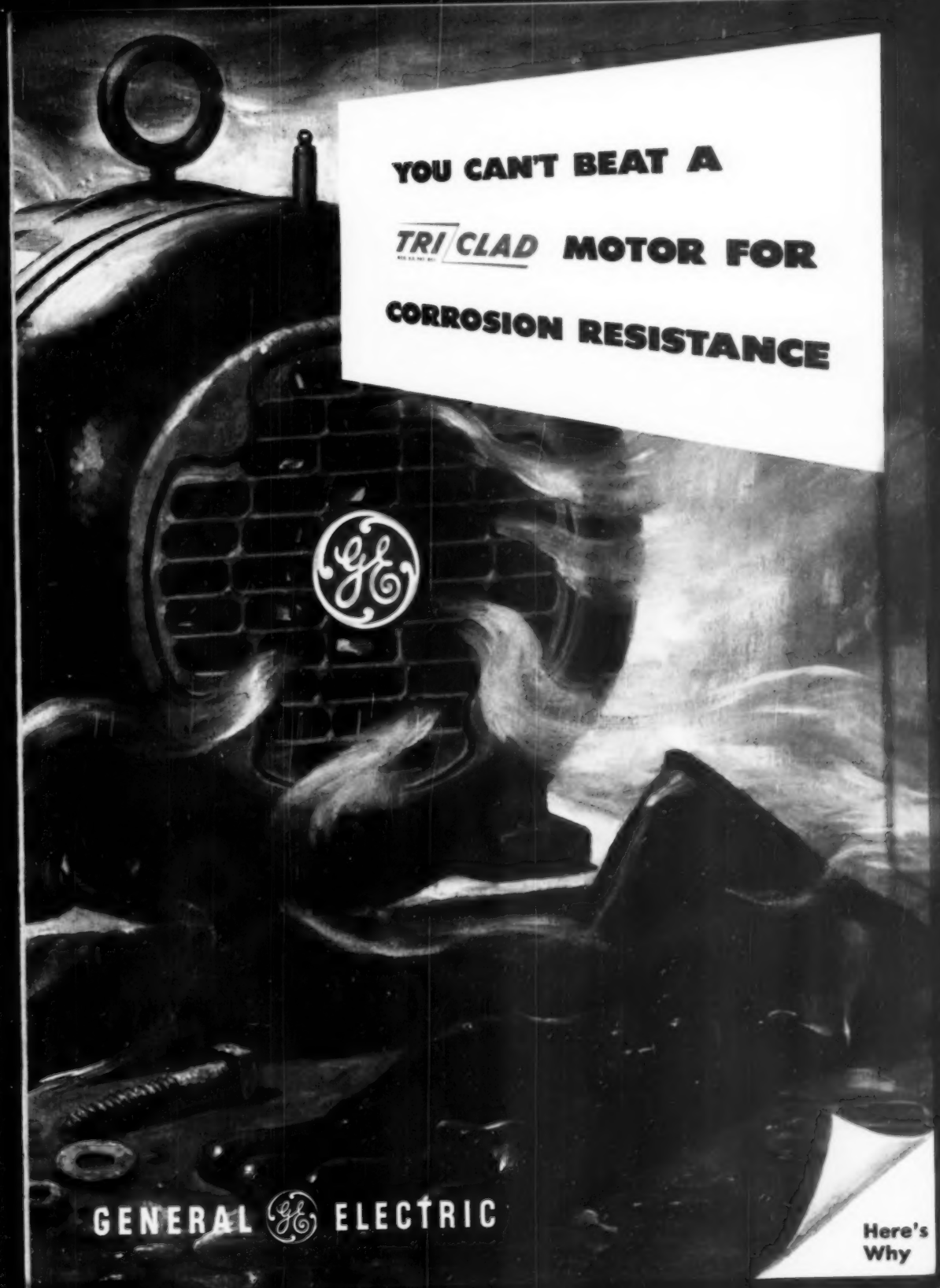
— boilers of all-welded construction — meet standards of A.S.M.E. boiler code and leading underwriters — burner approved by recognized national agencies.

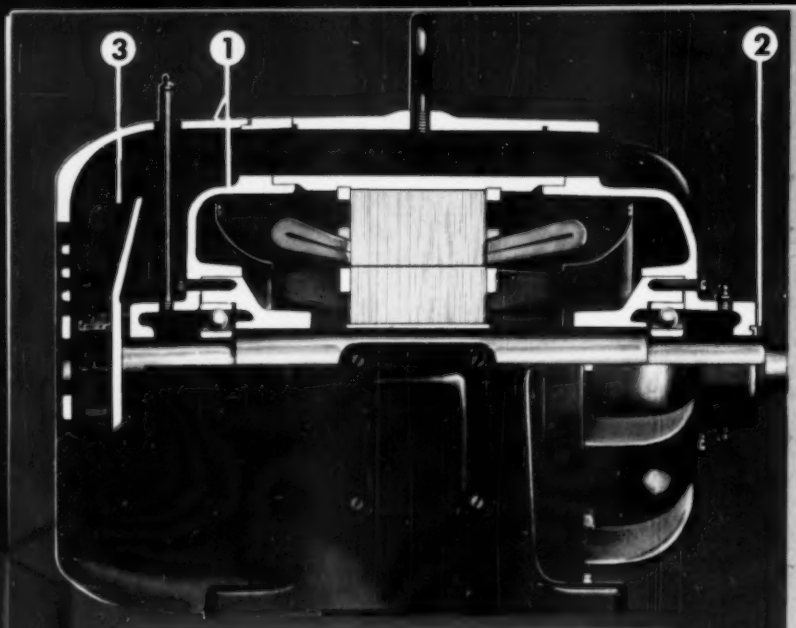
The Cleaver-Brooks Model LR self-contained boilers are of a highly developed four-pass fire tube design — tested and proved by factory and field experience on several thousand boilers of this type.

Write for complete specifications, dimension data, firing rates.

CLEAVER-BROOKS COMPANY
365 EAST KEEFE AVENUE
MILWAUKEE 12, WISCONSIN

Now Ready: Bulletin SG 142 contains detailed data and description of the MODEL LR. Send for your copy today!


YOU CAN'T BEAT A
TRI CLAD MOTOR FOR
CORROSION RESISTANCE
GENERAL ELECTRIC
Here's
Why



Here's the totally enclosed Tri-Clad double-shell structure (1) that locks out dirt, flying metal chips, abrasive dust and corrosive fumes. Check the rotating labyrinth seal (2) which prevents foreign matter from working in along the shaft. Note the cast-iron housing, the corrosion-resistant G-E Textolite* material cooling fan (3). Fan circulates cooling air between the shells—no contaminated air touches the punchings or inside parts.

You can't beat TRI CLAD motors for corrosion resistance

REG. U.S. PAT. OFF.

Acid fumes, alkali dust, dye-house vapors, tropical weather — you name *your* motor "poison." You just can't beat Tri-Clad cast-iron construction for corrosion resistance.

Rolling up 6 billion hours of service on all kinds of jobs, more than 1,876,000 Tri-Clad motors tell the eye-opening story of cast-iron motor structure. You get an inherent damping action that minimizes noise and damaging vibration. You get rigidity that makes for permanent shaft alignment. (Try bolting a Tri-Clad motor to an uneven surface — the bolt will snap before you can twist the rigid frame out of line.) You get extra protection against jarring blows and rough handling. You get resistance to rust and corrosion that is not approached by any other metal used for standard motor construction today.

WANT MOTORS THAT STAY ON THE JOB ANYWHERE? There's a stock of Tri-Clad motors near you, in nearly all types and ratings, ready for **IMMEDIATE SHIPMENT**. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

*Reg. U. S. Pat. Off.
(standard on popular sizes)

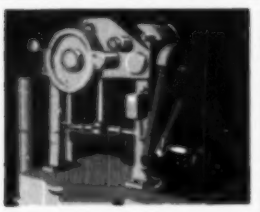
GENERAL ELECTRIC

YOU CAN'T BEAT TRI CLAD EXTRA PROTECTION

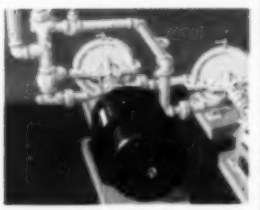
REG. U.S. PAT. OFF.

G-E capacitor motors for use on fans, blowers, pumps and compressors with single-phase power. From ¼ to 5 hp.

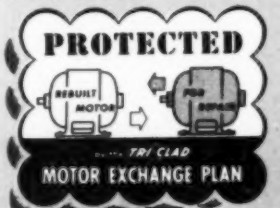
G-E Type ACA induction motors for adjustable speeds—provide speed ranges from 3-1 to 20-1. From 3 to 75 hp.



G-E open (dripproof) induction motors for constant-load, constant-speed applications. From 1 to 2000 hp.



G-E totally enclosed motors for outdoor operation, in abrasive dusts, or corrosive fumes. From 1 to 1000 hp.



Look for this **EXTRA** on the motor you buy!

How to simplify your piping jobs ...Standardize on the CRANE line

ECONOMICAL VALVES FOR LOW PRESSURES

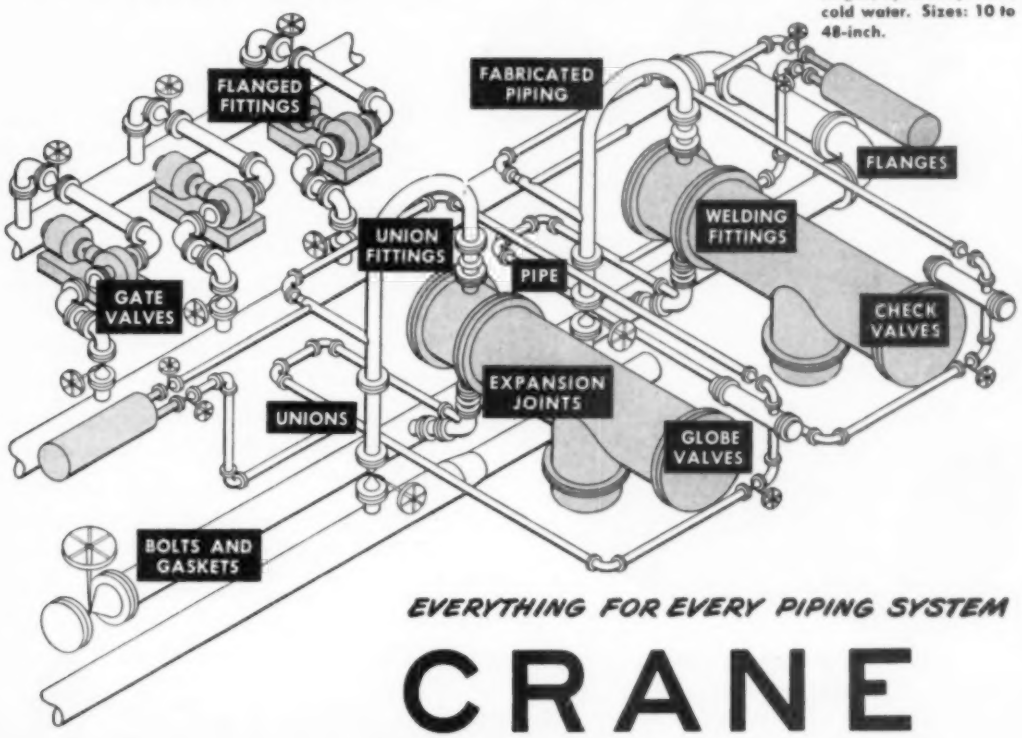
Keep Crane 25-Pound Iron Body Double Disc Gates in mind for services that don't require the usual 125-Pound valves. Rated at 25 Pounds Steam or Gas, and up to 50 Pounds Water, depending on size, they give superior service in a wide variety of applications. Use them inside or out; their oval-shaped body and bonnet have ample reserve strength under line stresses. Short and compact, they take minimum space in pipe lines.

For durable, tight seating—yet easy opening—seat rings and disc faces are brass. Crane 2-piece ball-type gland maintains uniform pressure on packing; prevents binding on stem; lengthens packing life. When specified, these valves can be fitted with gears, by-pass, and clean-outs; also can be motor or cylinder operated; non-rising stem, flanged or hub ends, up to 36-in.; O.S. & Y. type with flanged ends only up to 48-in. See your No. 49 Crane Catalog.

CRANE CO., 836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

No. 793½, Outside Screw and Yoke. Working Pressures: 25 pounds steam or gas; up to 50 pounds cold water. Sizes: 10 to 48-inch.

ONE ORDER TO CRANE COMPLETELY EQUIPS CIRCULATING, COOLING AND SERVICE WATER PIPING SYSTEMS



EVERYTHING FOR EVERY PIPING SYSTEM

CRANE

VALVES • FITTINGS • PIPE • PLUMBING AND HEATING

Flanged bonnet, welding end, high pressure, gate valve.

WHEN YOU WANT

BOTH Precision and Economy

Specify CHAPMAN STEEL VALVES

Want valves with precision ratings that equal or exceed standard specifications? Then specify Chapman Valves. You'll find them the equal of custom-made valves *every time.* Yet they are economical — with the economy that comes from production line manufacture.

You'll find it will pay to specify Chapman valves for every power plant need . . . for longer service, for better service, for lower maintenance.

Available in three types of body and bonnet connections — welded, pressure sealed or flanged. Also in gate, globe, angle, or check types. Welding end valves available in globe as well as in tilting disc styles.

The Chapman Valve Mfg. Co.
INDIAN ORCHARD, MASS.

Timely Comments

Every Day Is Election Day

IN THE SENSE that the American consumer, by his purchases, votes daily as to which companies shall succeed, grow large and stay large, or vice versa, every day is election day in American industry, according to Harold Brayman, director of public relations of the Du Pont Company.

No company can stay big except by the confidence of the people in the integrity and price fairness of the product, and by their vote, as purchasers, that they prefer it to others.

Every time a man buys an automobile, he casts his vote—by a good democratic system—as to whether General Motors, or Ford, or Chrysler produces the best car for the money, or whether Nash, Hudson, or Studebaker does; the customer determines which of these shall be biggest.

No Monopoly

The factor of mergers in the growth of larger businesses has been greatly distorted in public discussion, according to Mr. Brayman. Monopoly is defined as the exclusive control of the supply of any commodity or service in a given market to permit raising the price materially above that fixed by free competition.

In view of this definition, Mr. Brayman protects monopoly accusations aimed at such companies as Sun Oil which, according to government figures, has only 8.5 per cent of the oil business in its marketing area, A & P, with 7 per cent of the grocery business in the United States, and Swift and Company and other competing packers, no one of which does over 15 per cent of the meat packing business in the U. S. Du Pont does only 7 per cent of the chemical business in the United States.

"Out of the small and medium sized businesses of today will come the big businesses of tomorrow. The small and medium sized businesses could no more exist without the big businesses than the big ones could exist without the small and medium sized ones.

"For example, if each manufacturer of nylon stockings had to make his own nylon yarn, none of your wives would be able to afford the stockings.

"If big businesses are throttled today on the pretext that they operate against the public interest, it will be only a brief interval before the time will arrive when medium and small businesses will be throttled in the same way and for the same reasons.

Americans, with 6 per cent of the land acreage of the world and 7 per cent of its population, have more than 80 per cent of the world's automobiles, more than half of its radios and telephones, more than a third of its railways, 46 per cent of its electric power, 50 per cent of its hospital beds and 52 per cent of its high school enrollment.

"The reason for this is not that we have more resources than Russia or China, but because we have an industry here that makes use of initiative and enterprise and so is capable of producing goods in mass quantities for the masses of the people.

"While no one can maintain that everything is right in America, it is better here than anywhere else in the world and better especially than in those countries devoted to the principle of all people starving equally. It is better almost solely because of the system that it is now so popular to condemn."

South Carolina Doing Excellent Job

SOUTH CAROLINA is perhaps doing a better job than any other Southern state in promoting industrial development, according to a report of the Southern Association of Science and Industry.

Citing a recent Federal Reserve Bank report showing South Carolina second among all 48 states in gains in the past ten years in dollar value added by manufacture, the report compliments Palmetto state officials.

It is pointed out that Governor Thurmond has taken an active personal interest in industrial development and has an alert, aggressive research, planning, and development group headed by L. W. Bishop. The work of the Charleston development board was also commended.

Other Southern states can well afford to pattern their development plan along the same lines as the South Carolina program which has brought excellent results.

no testing here

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STANDARD OIL COMPANY INCORPORATED IN KENTUCKY

Industry Speaks

Manufactured Gas and Competitive Fuels

Abstracted from an address by Dr. John F. Foster, Battelle Memorial Institute fuels expert, and Dr. Richard J. Lund, authority on engineering economics, before a recent meeting of the American Institute of Chemical Engineers.

AT present prices, there is little chance of research developing a manufactured gas from coal which can compete directly with natural gas. Delivered wholesale prices of natural gas would have to double, at least, before science can produce from coal a fuel gas that would be competitive. Likewise, there is little chance of manufactured gas competing with fuel oil at present price levels.

Producer Gas

Surveying the various methods for gasifying coal, the costs of competitive fuels, and the trends in fuels economics, Drs. Foster and Lund see competitive hope only for producer gas among the various manufactured gases. Producer gas is an industrial fuel gas usually manufactured at the plant where it is used. It is the cheapest of the manufactured gases, but cannot be transported economically for any great distance because of its low heating value.

Producer gas may be on the threshold of a comeback. In the first place, it costs less in heating value than distillate (light fuel oil) in 1949, and only slightly more than heavy fuel oil. In the second place, it assures a steady supply of fuel gas. This is important if interruptions of natural gas to industry are likely to occur because of pipeline breaks or peak domestic demands during severe weather, and if the long-term supply of fuel oil is uncertain. With future development of improved techniques for using low-cost waste coal, producer gas might be made for as low as 25 to 30 cents per million Btu.

Another use of manufactured gas might develop where natural gas is not available and where low Btu producer gas is not satisfactory. There is good likelihood of developing through research a cheaper gas of 300 to 500 Btu per cu ft for this purpose. It would, however, cost more than natural gas.

Coal gas has been used for industrial purposes for more than 100 years. The history of the fuel has been filled with ups and downs as the result of the competitive influences of oil and natural gas.

Several types of fuel gas are made from coal. Producer gas, the cheapest, has a heating value of about 150 Btu per cu ft. Water gas has a value of about 300 Btu; carburetted water gas, 530 to 550 Btu; coke oven gas, 600 Btu; and Lurgi gas 450 Btu. All are more costly than natural gas, which has by far the greatest heat content.

Supply and Costs

Points which must be considered in addition to current economics are the supply situations and trends in costs of competitive fuels.

Supplywise, the country is favored with abundant **coal**, enough to last hundreds of years.

Proved domestic reserves of **petroleum** are only sufficient for about twelve years of consumption at the present rate, although imports and new discoveries will undoubtedly prevent critical peacetime shortages for many more years.

Proved domestic reserves of **natural gas** are huge—around thirty times our annual consumption. But transportation to the consumer involves costly pipe lines and the dedication of large portions of gas reserves to supplying markets for as long as 20 years in the future. The popularity of natural gas is causing rises in price at the field and longer pipelines built at present high costs mean increased transportation costs.

According to the Battelle men, supply and economic trends will tend to narrow the gap between manufactured gas and its competitive fuels.

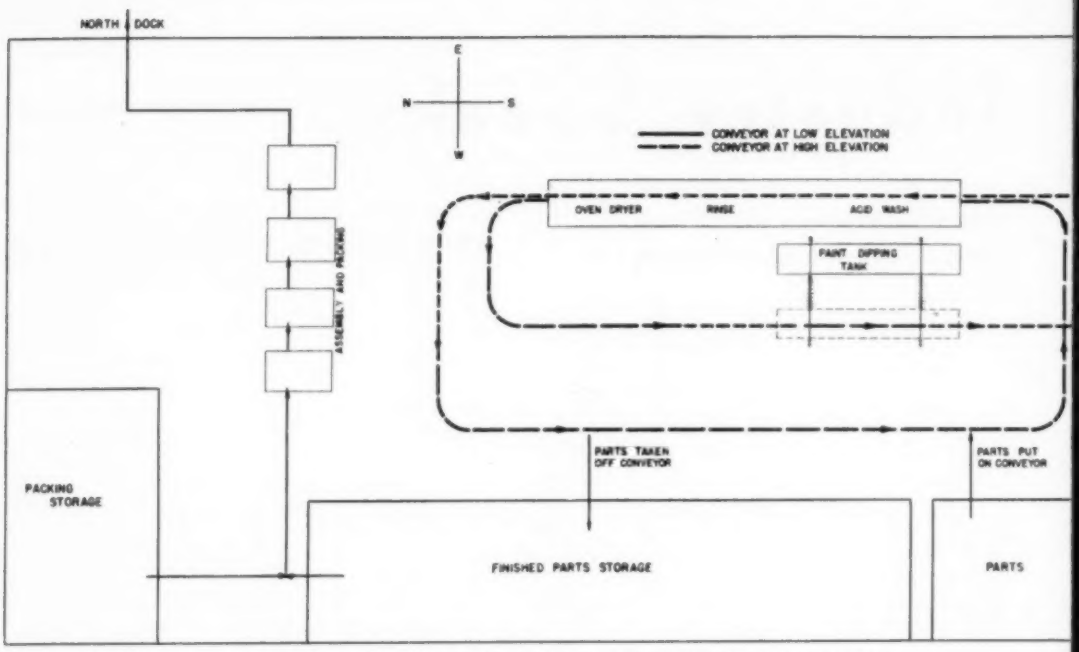
Electric Utilities and Industrial Development

Abstracted from an address by Mr. Maurice L. Wilson, Georgia Power Company industrial development engineer, before the May 1 Annual Meeting of the Southern Association of Science and Industry in Charleston, S. C.

ELECTRIC utility firms in nine Southern states alone will spend well over one billion dollars for new facilities during the five year period 1949-1953.

Private utilities in nine states spent $284,410,000 for new facilities in 1949, will spend $304,506,000 during 1950, and have scheduled expenditures of $633,903,000 for the 1951-53 period. This is a five-year total of $1,222,820,000.

Mr. Wilson emphasized that these are the planned expenditures of private electric utilities **only**, and that many other groups are active in promoting industrial development in the region. The South has never known such a generally healthy condition in nearly every line of activity.



GENERAL FLOW OF MATERIALS IN STAR MANUFACTURING'S NEW STORAGE EQUIPMENT DIVISION PLANT.

—— Continuous Conveyor Feature of

New Kansas City, Kansas division of the Star Manufacturing Company of Oklahoma manufactures steel storage equipment. Modern plant features an extensive monorail system, overhead baking and drying area, and flexible production lines.

THE Star Manufacturing Company of Oklahoma City has been materially expanding its metal fabricating facilities in the Southwest and national distribution of all-purpose prefabricated steel buildings and miscellaneous products.

The most recent step is the company's new storage equipment division plant near Kansas City, Kansas. Star is now moving over 300 tons of steel sheets and structurals through the plant each month.

The modern factory combined with a paved truck handling area of over 19,000 sq ft covers nearly 4½ acres. Two covered loading docks have been provided; a long south dock for the rapid handling of truck loads of flat sheets; and a north dock for finished part shipment.

A switch track of the Santa Fe Railroad runs the full length of the west side of the building. Two 14 ft sliding doors on freight car centers at the south end of the building permit simultaneous unloading of structural steel and flat sheets from two freight cars.

Operation

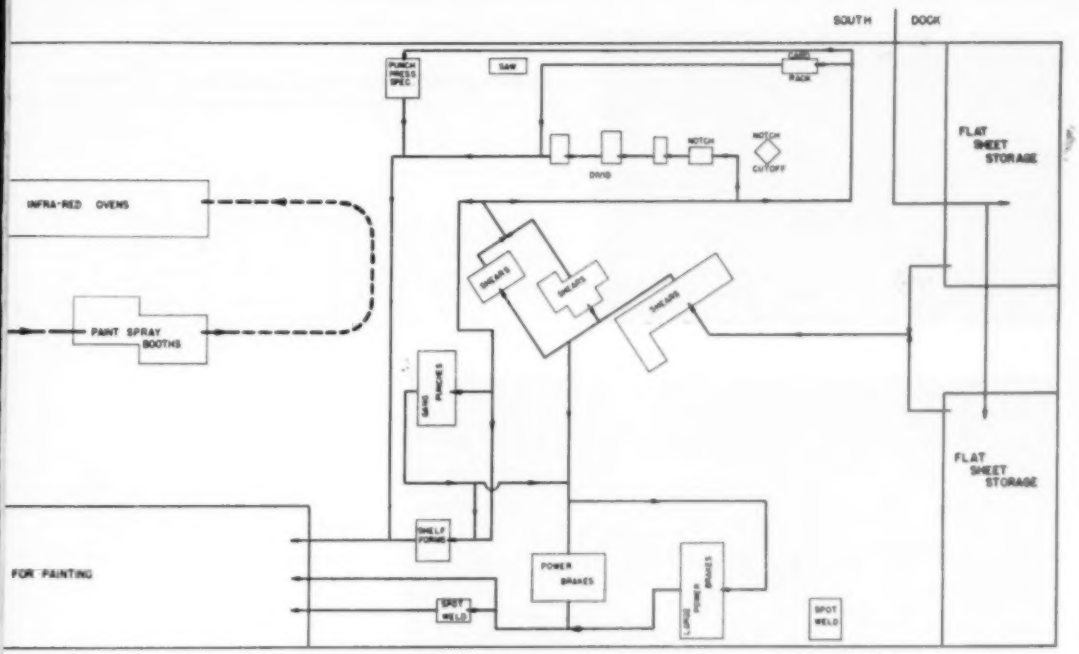
Five-thousand-pound Towmotor fork trucks are utilized for major warehouse handling. They warehouse all the steel in the south end of the building and place various gauges (No. 10 - No. 26) on Nutting Caster Company rolling tables for movement to the initial shearing operation.

The flat sheets are selected for size and gauge and sheared to stretch out size on a No. 10 gauge 10 ft Niagara Shear. Second cutting operations, which process the steel to shorter sections, flow north over a 16 gauge 4 ft Wyson and Miles shear or a 16 gauge 3 ft Pexto unit.

After the steel is punched on an O. K. Machine and Tool Gang Punch, it is ready for forming operations.

Forming

The west side of the machine shop forms the large sheets, while



THE FOSTORIA ELECTRIC MONORAIL CONVEYOR MOVES AT A SPEED OF FROM 3 TO 11 FT PER MINUTE.

Star Manufacturing's New Plant —

By
Raymond V. Schroeder

General Manager
Storage Equipment Division
Star Manufacturing Company
Kansas City, Kansas

Each month over 300 tons of steel sheets and structurals move through this new storage equipment plant of the Star Manufacturing Company.

the east side handles the small sections. The rolling tables holding the punched large sheets are placed behind either of the power brakes. A 60 ton, 10 ft Verson power brake bends the larger sizes, while a 35 ton, 8 ft Dreis and Krump unit handles the smaller sheets and the second operations from the larger power brake.

Two Rex spot welding machines are located in this department for sub-assembly work. There is also a Star designed power brake for forming shelves for automotive parts bins in one operation.

Parts from the smaller shears pass to the east side of the machine shop where they are punched and formed on a battery of punch presses ranging from a 7 ton Swaine to a 60 ton Rockford. The 60 ton Rockford is also used for finishing some parts from coil stock to finished product.

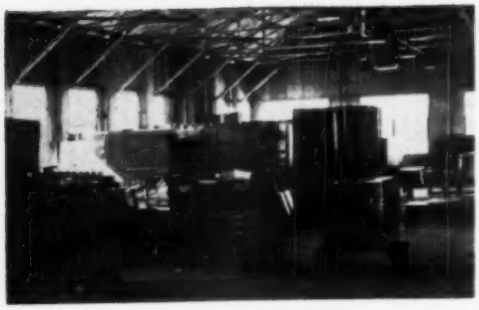
Finishing

Formed sheets from both the east and west production lines of the machine shop move forward to the west side of the finishing department to a Fostoria Monorail conveyor. Parts are attached to special Star designed conveyor hangars and conveyed at a speed of from 3 to 11 ft per min, depending on the area of gauge of parts being processed.

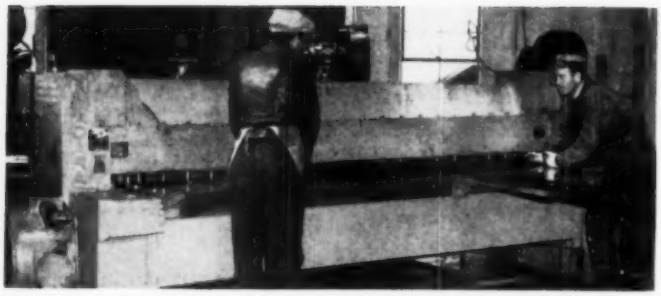
The conveyor then enters a 3 stage Blakeslee washing machine. In the first stage the metal is cleaned with a light phosphoric acid wash, rinsed in second, and in the third stage a large 500,000 Btu per hour gas fired oven dries the parts.

The conveyor then makes a "U" turn paralleling the washer, carrying the formed sections through a paint dipping operation. Continuing south, the conveyor moves through two DeVilbiss spray booths.

All small parts are processed through the paint emersion tank. However, large sections with numerous punched holes and not amendable to the dipping operation, are finished in the spray



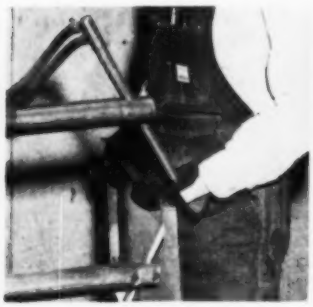
WAREHOUSE SPACE AT SOUTH END OF STAR MANUFACTURING'S NEW KANSAS CITY, KANSAS STORAGE EQUIPMENT DIVISION PLANT. STRUCTURAL STEEL AND FLAT SHEETS ARE HANDLED FROM STACKS BY TOWMOTOR FORK TRUCKS AND PLACED ON NUTTING CASTER COMPANY ROLLING TABLES FOR MOVEMENT TO INITIAL SHEARING OPERATION.

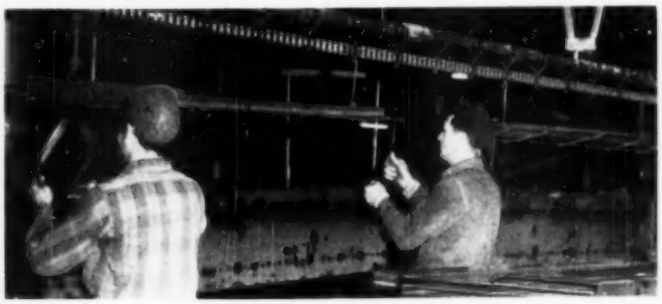


FLAT SHEETS ARE SELECTED FOR SIZE AND GAUGE AND SHEARED ON THIS NO. 10 GAUGE, 10 FT NIAGARA SHEAR. SECOND CUTTING OPERATION IS HANDLED BY EITHER A 16 GAUGE WYSON AND MILES SHEAR OR A 16 GAUGE PEXTO.

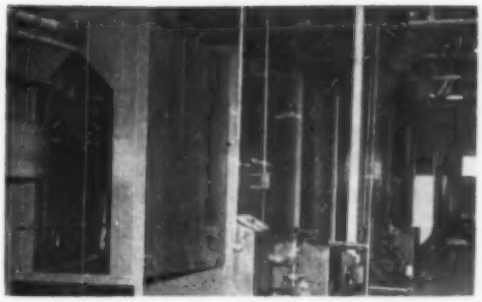
AFTER PUNCHING OPERATIONS, THE STEEL IS READY FOR FORMING. THIS 60 TON, 10 FT VERSON POWER BRAKE FORMS THE LARGER SHEETS WHILE A 35 TON, 8 FT DREIS AND KRUMP POWER BRAKE HANDLES THE SMALL SECTIONS.

REX SPOT WELDERS ARE LOCATED IN THE WEST SIDE OF THE MACHINE SHOP. FINISHED MATERIAL IS LOADED ON A FOSTORIA ELECTRIC MONORAIL CONVEYOR FOR FINISHING OPERATIONS. EACH PART IS HUNG ON SPECIAL CONVEYOR HANDLES DESIGNED BY STAR. CONVEYOR MOVES AT A SPEED OF FROM 3 TO 11 FT PER MIN, WHICH IS DETERMINED BY AREA OR GAUGE OF PART.



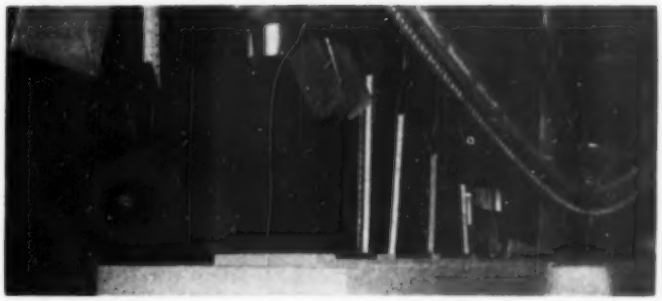


in Star Manufacturing's Kansas City Plant



METAL PARTS PASS THROUGH A 3 STAGE BLAKESLEE WASHING MACHINE. FIRST STAGE CLEANS THE METAL WITH A LIGHT PHOSPHORIC ACID WASH; SECOND RINSES THE PARTS; AND IN THE THIRD STAGE A LARGE GAS FIRED OVEN, HAVING A CAPACITY OF 500,000 BTU PER HOUR, DRIES THE PARTS. METAL IS NOW READY FOR PAINTING.

AUTOMATIC PAINT DIPPING TANK AT RIGHT IS MOUNTED ON RAILS SO THAT IT CAN CLEAR CONVEYOR LINE. SMALL PARTS ARE DIPPED; LARGE SECTIONS, WITH NUMEROUS PUNCHED HOLES, ARE SPRAY PAINTED AS SHOWN BELOW.



FROM PAINT BOOTH, CONVEYOR RISES TO PASS THROUGH BOWSTRING TRUSSES OF THE ROOF, WHERE A FOUR BANK FOSTORIA INFRARED BAKING OVEN IS LOCATED. CONVEYOR DESIGN PROVIDES AIR COOLING TIME THROUGH TRUSSES.

FINISHED PARTS ARE PALLETIZED FOR MOVEMENT TO ASSEMBLY DEPARTMENT. FORMED SECTIONS ARE ASSEMBLED WITH ELECTRIC SCREW DRIVERS INTO AUTOMOTIVE PARTS, BINS, SHELVING, LOCKERS, STORAGE CABINETS, BENCHES, TABLES, ETC. STACK BOXES, DRAWERS, ETC., WHICH ARE SHIPPED KNOCKED DOWN, ARE PACKAGED AS THEY COME OFF THE CONVEYOR LINE.

STAR MANUFACTURING COMPANY—KANSAS CITY.

booths. This is accomplished in the special Star design by having the dipping tank mounted on rails, thus affording flexibility. The tank can be easily moved clear of the conveyor line.

Continuing south from the paint booth, the conveyor rises at a sharp angle to pass through the bowstring trusses of the roof. It reverses itself and passes through a four bank Fostoria Pressed Steel Corporation infra-red oven. Continuing north, the line provides air cooling time through the trusses. After passing north over the 3 stage washing machine the conveyor drops between trusses to a 7 ft level for unloading.

When the paint dipping process is being employed, one man can handle 70 to 80 per cent of the loading and unloading of the continuous conveyor. Some of the bulky parts, 7 to 8 ft in length, require the services of two men.

Finished parts are then palletized for movement to the assembly department. Here, in a floodlighted area, the formed sections are assembled with electric screw drivers into automotive parts, bins, shelving, lockers, storage cabinets, counters, tire racks, work benches, tables, etc.

Stack boxes, drawers, nail bins, etc., which are shipped knocked down, are packaged as they come off the conveyor line.

Supplemental Features

Another feature of the plant is the utilization of electric bus duct, permitting production line flexibility. Large unit heaters provide warm air in the winter and circulating air in the summer. Roof of the building is insulated with glass wool and the side walls with insulating board. The large aisles and open storage space provide for easy handling and maintenance.

Deterioration in Cooling Towers

Circulating water is treated to prevent scale formation in heat exchangers and to protect the metals against corrosion; but no thought is given to the protection of the wood except in rare instances. Wood was developed by nature to withstand forces attacking a living organism, and we put it to a most unnatural use.

By D. R. Baker

Engineering Research Division
The Marley Company, Inc.
Kansas City, Kansas

THERE is a vast amount of information available regarding wood, its products and uses; but little is known about its life and deterioration in cooling towers although it is the most common material used in their construction.

The materials used in cooling towers are exposed to an atmosphere of warm, humid air, and a complete range of moisture conditions varying from water-flooded to completely dry. The temperature range is moderate but it includes the optimum growing conditions for wood-destroying organisms. All metals in cooling towers must be corrosion-resistant or have some type of protective coating applied; and in testing these protective coatings, it has been found that specimens exposed in a cooling tower fail sooner than they do when undergoing the so-called accelerated immersion tests using acids, bases and salt solutions. The severity of these conditions should cause us to expect wood to deteriorate very rapidly. The surprising thing is that deterioration is the exception rather than the rule.

Adaptability of Wood

The remarkable durability of wood makes its use most important in many industrial applications. It will withstand a wide range of hot or cold neutral salts and dilute acids or alkalies. It is widely used in the manufacture of tanks because of its resistance to chemical attack, and species used for this purpose are selected because of their durability and impermeability. Such woods include cypress, redwood, douglas fir, southern pine, larch and white oak. Wood adaptable to use in cooling towers must be durable under the conditions encountered, and be able to withstand alternate wetting and drying without developing structural defects. It must have sufficient structural strength, and be commercially available in the required sizes and grades.

Deterioration

Both chemical and biological deterioration have been found in

Editor's Note

A more complete explanation of the causes of wood deterioration in cooling towers and a program of preventive measures are being made by the Forest Products Laboratory under a series of cooperative agreements entered into with The Marley Company.

This brief progress report was abstracted from "Wood Deterioration in Cooling Towers", presented at the April A.S.M.E. Region VIII meeting in Dallas, Texas, by Mr. D. R. Baker of The Marley Company.

Engineers confronted by this problem can obtain copies of Mr. Baker's 43 page report from The Marley Company, Inc., Kansas City 15, Kansas. This detailed discussion includes a general study of the characteristics of wood, its durability in similar environments, and the known patterns of deterioration.

cooling tower woods. Neither has been confined to any one make or type of tower, and they both occur in various species of wood. It has only been during the past year or two however that decay has been an important factor, so our knowledge on this type of attack is so limited that detailed studies on this subject are needed, as will be pointed out later.

Delignification is a type of chemical attack that has been known and studied for some time, and it is generally attributed to the presence of sodium carbonate in the circulating water. Minute quantities of other "pulping" agents are often present in circulating waters and may account for the different types of deliginification that occur, as well as influencing the severity of the attack. It is quite probable that further study will disclose that a chemical attack precedes biological decay.

Aeration in a cooling tower provides an oxidizing environment that will attack the lignin and tannin. Ferrous salts absorbed by the wood may act as catalysts in the oxidation of cellulose, hemicellulose, lignin and tannin. The occurrence of brown rots in wood adjacent to iron indicates a possible relationship between the two. Chlorine and potassium permanganate are oxidizing agents, and one case has been reported where chlorine attacked the wood. Chlorine in the presence of sodium hydroxide will form sodium hypochlorite which is a strong pulping agent.

An alkaline condition, which is usually present in a cooling tower, may stimulate the growth of fungi by neutralizing the acids formed. Alkalies will attack the lignin and tannin and produce a swelling of the fibers which will allow deeper penetration of the water. Sulphur compounds in the presence of alkalies produce pulping agents.

Simple leaching will remove the water soluble extractives, and this will be accelerated if the permeability has been increased by alkalies. All of these conditions exist in a cooling tower, but little or no research has been undertaken to date to determine their effect.

Types of Decay

Two distinct types of decay have been observed in cooling tower lumber, the brown cubical rot and the light pocket rot. Cultures of two wood-destroying fungi have been isolated from wood affected with the light pocket rot. No pure culture has been obtained of the fungus causing the brown cubical rot, but it is obvious that a total of at least three species of fungi are involved in the decay of wood in cooling towers.

An obvious explanation for the occurrence of decay in cooling towers is that the lumber affected lacked a natural resistance to decay. This seems highly improbable, however, because the attack is usually quite general in certain parts of a tower and absent elsewhere. It is known that the durability of any species varies, but it is inconceivable that chance could segregate the nondurable lumber in one part of the structure and leave the lumber in the rest of the tower resistant to decay. It is more probable that conditions in a certain zone will lower the resistance by chemical attack and allow fungi to enter.

The current investigation is covering the analysis of wood removed from a number of unaffected cooling towers to determine if it has lost its natural resistance to decay. This will include inoculation of the wood with wood-destroying fungi at the Forest Products Laboratory as chemical analyses of the wood to determine any change in the constituents. Continuous efforts are being made to isolate cultures of all of the fungi involved. A complete history is being compiled of each installation reporting decay in an effort to determine any common denominator that may be the cause.

Future Program

Preservative treatments are available that will protect wood against decay, but, like the natural preservatives of wood, they are effective only so long as they remain in the wood. This is another instance where test data is lacking because most cooling towers have been constructed of wood having natural durability. Some treated wood has been used in cooling towers in the past, but actual research on that application has not been extensive. Another phase of the present program includes the installation of wood specimens treated by various processes in a selected group of cooling tower. Samples will be removed periodically for analysis to determine the effectiveness of the various treatments.

Another contemplated project will cover a study of the effect of mild chemical solutions on the durability of wood. Separate solutions of constituents normally encountered in cooling tower waters will be used to determine the affect of the various components on the wood.

It is hoped that concerted efforts will soon make it possible to offer a more complete explanation of the causes of wood deterioration in cooling towers, and also to offer a program of preventive measures to combat the problem.

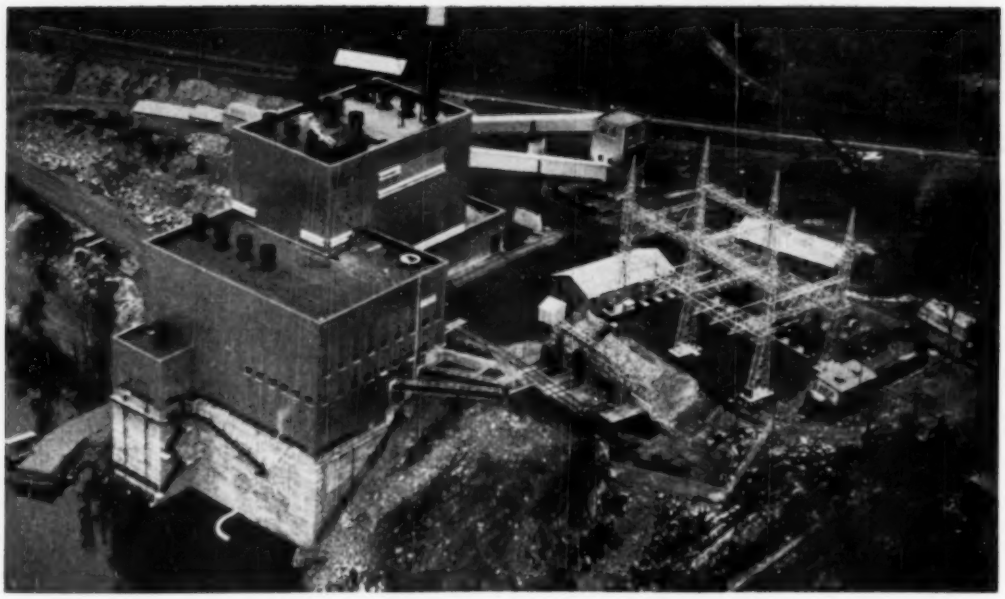


FIG. 1. THE NEW RIVERTON STATION AS SEEN FROM THE AIR. NOTE THE PLANT IS FITTED TO THE CONTOUR OF THE GROUND. THE WALLS ARE MADE OF FLUTED ALUMINUM PANELS.

Potomac Edison's New Riverton Station Completes Power Triangle

Building fitted to ground contour, one-floor operation, and aluminum wall panels are features of the new Riverton Station.

By Dwight Collmus

Power Department
The Potomac Edison Company
Hagerstown, Maryland

NOW in full operation, the Potomac Edison Company's new 40,000 kw Riverton Station is located on the north bank of the Shenandoah River, about three miles north of Front Royal, Virginia. The plant site consists of approximately 91 acres, part of which borders and connects with a main branch of the Norfolk and Western Railroad.

The new Riverton Station is in the center of the rapidly growing Virginia-West Virginia industrial area surrounding Winchester. Also, the $7,500,000 plant is at the third corner of a power triangle, the legs of which are made up of Potomac Edison System high voltage transmission lines. Thus, with the installation of Riverton, no large section of the company territory is far from a major power station. The R. Paul Smith Station at Williamsport, Maryland, and the Cumberland River Plant at Cumberland, Maryland, make the other two triangle points.

This power triangle insures closely controlled voltage regulation. Greater continuity of service is also possible, for power interruptions because of emergency plant shutdowns may be curtailed by routing current to the locality affected from two independent sources over two independent lines.

General Construction Features

Core drillings which were started on March 12, 1947 in the limestone bluffed north shore of the river, led to fitting the plant to the contour of the land. The bottoms of the concrete footings are stepped from the screen house to the draft plant in accordance with the natural contour of the rock surface. The top of the screen house lower floor slab is at river bottom elevation, sixteen feet, six inches below normal pool level. At the lowest point, the concrete foundation extends nine feet above

the highest flood level recorded to date, with a four foot concrete wall furnishing additional protection.

The building superstructure is a steel frame with fluted panel aluminum walls. Approximately 26,500 sq ft of sixteen gage mill finish uninsulated aluminum "S" panels, and 23,800 sq ft of sixteen gage mill finish insulated aluminum "Q" panels were installed. Insulated paneling differs from the uninsulated by addition of one and one-half inches of preformed fiber glass, isolated by unsaturated asbestos and backed by eighteen gage flat, metal coated steel.

The insulated paneling surrounds working areas so as to maintain more comfortable working conditions. Small additional areas of paneling and flashing were installed, including 2,300 sq ft of special louvered windows. The accompanying cross-sectional sketch shows the H. H. Robertson Company fluted aluminum paneling as installed.

Outside the station, the area to the west is reserved for the installation of additional steam turbine generating units. South of the plant is the river across which is the fifty acre site of the ash settling basin. The ash sluicing pipe connecting the plant with this basin lies on the bottom of the river. This location for a settling basin was chosen because of the availability of a large area of land at a lower level than the station.

To the east is the substation and transformer platform. On the north lies the coal handling area, with initial provision for storage of twenty thousand tons of coal.

Coal Handling System

The railroad siding separates from the main line at the northeastern end of the property, splits off a spur for the building, passes over track hoppers, and then rejoins the main line at the northwestern end of the property.

At the track hoppers, two Syntron feeders speed the flow of coal to a thirty-six inch conveyor belt which lifts it to the top of the crusher house. Here, the coal falls by gravity through a hammermill crusher and on to a second conveyor belt. This conveyor carries the coal to the boiler house, passes over a continuously weighing scale, and then discharges through a continuous sampler to a third belt which deposits the coal in the bunker. As presently designed the conveying system is capable of handling 175 tons of coal per hour.

Every effort has been made to keep coal dust about the plant at a minimum. The bunker is capped, and the room above the bunker is partially air-tight with respect to the rest of the plant. When the conveyor is in operation, the dust laden air is constantly exhausted from the top of the bunker and the particles are filtered from the air to be later returned to the bunker.

From the bunker, the coal passes through six Riley drum-type feeders which regulate its flow to the three Riley Atrita duplex pulverizers. These pulverizers are sized to grind the coal to a fineness of seventy-five per cent through a 200 mesh screen when operating at a maximum capacity of 15,600 pounds of coal per unit per hour. This rating is based on coal having eight per cent total moisture and 50 Hardgrove grindability.

Steam Generating Unit

The Riley steam generating unit has a rated continuous capacity of 350,000 pounds of steam per hour, with 900 F and 920 psig at the superheater outlet, when burning a low grade coal of 12,000 Btu per pound, eight per cent moisture, twelve per cent

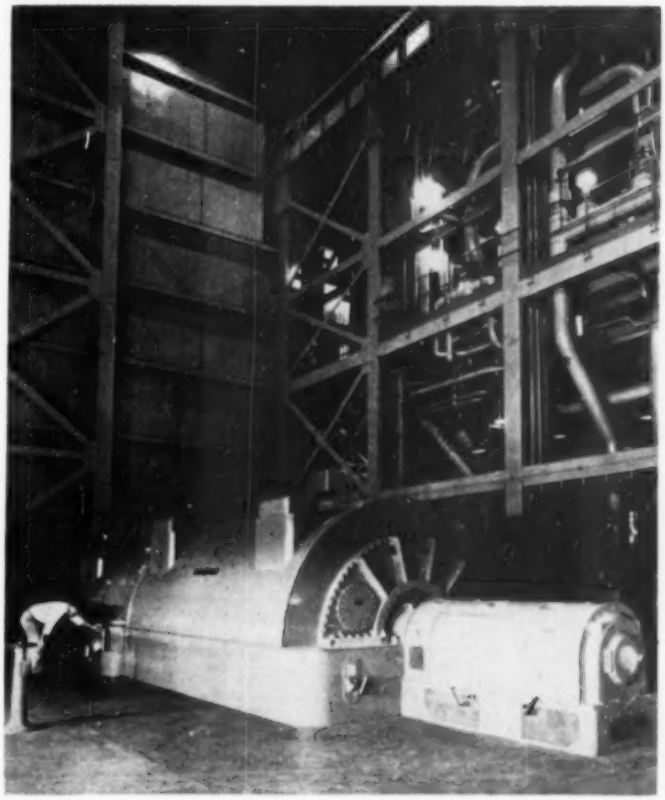


FIG. 2. THE 40,000 KW TURBINE-GENERATOR IS CLOSE TO THE 350,000 LB PER HOUR STEAM GENERATOR AND THE AUXILIARIES. THE "ONE-FLOOR" CONSTRUCTION PERMITS THE PLANT TO BE OPERATED BY THREE MEN PER SHIFT.

ash, twenty-nine per cent volatile, fifty-one per cent fixed carbon, and 2000 F ash fusion temperature. The unit is designed with a secondary superheater, a primary superheater, a high temperature air heater, an economizer, and a low temperature air heater in that order with respect to gas flow.

At rated load, air is supplied to the burners at 600 F and water is heated in the economizer from 385 F to 413 F. When operating above 160,000 pounds of steam per hour, the final superheat temperature is maintained at 900 F by passing a part of the outlet of the secondary superheater through tubes submerged in the number two boiler drum thereby reducing the temperature of steam supplied to the primary superheater.

Turbo-Generator

Riverton's General Electric turbo-generator is rated at 43,125 kilovolt-amperes with eighty per

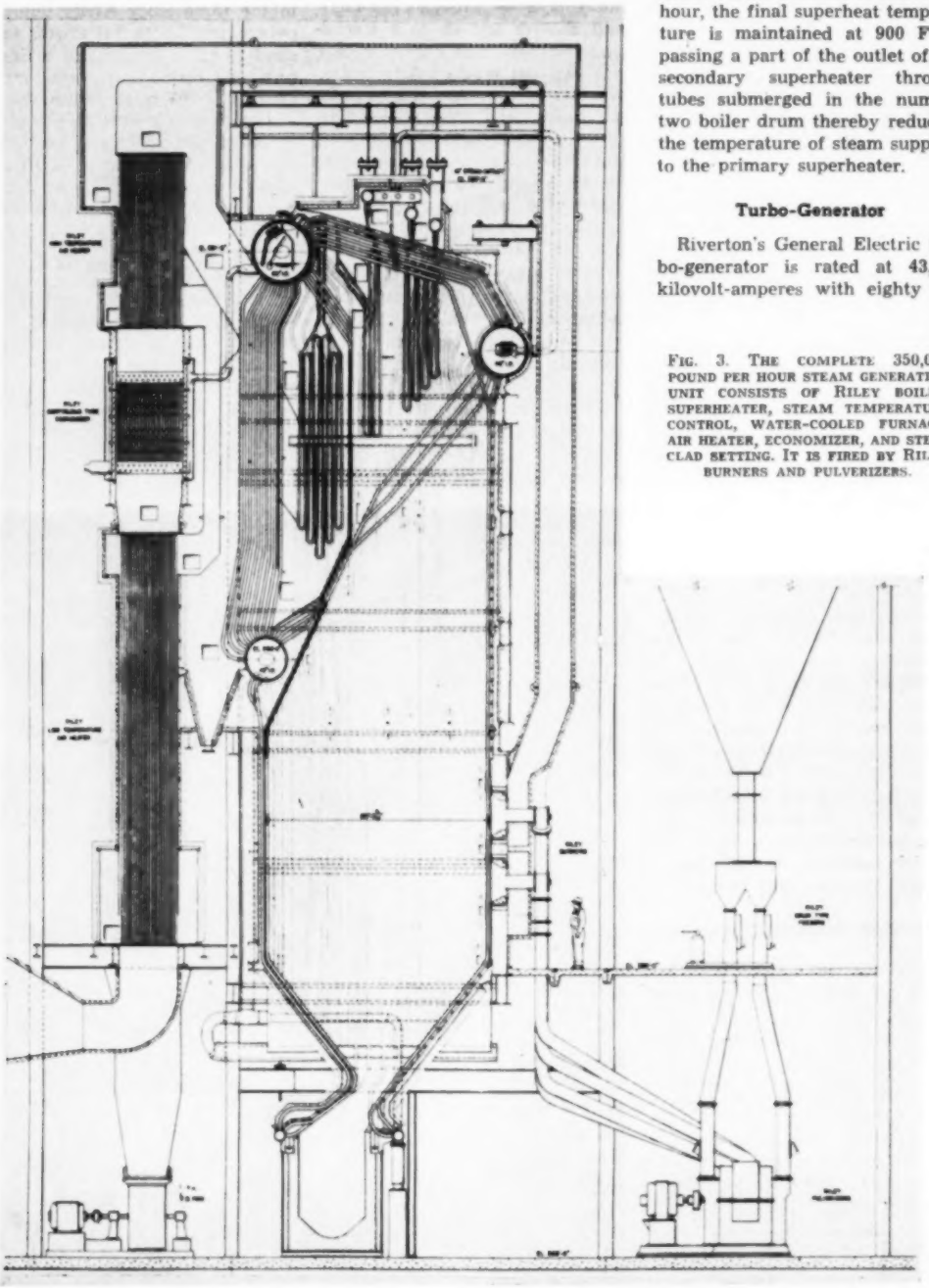


FIG. 3. THE COMPLETE 350,000 POUND PER HOUR STEAM GENERATING UNIT CONSISTS OF RILEY BOILER, SUPERHEATER, STEAM TEMPERATURE CONTROL, WATER-COOLED FURNACE, AIR HEATER, ECONOMIZER, AND STEEL CLAD SETTING. IT IS FIRED BY RILEY BURNERS AND PULVERIZERS.

cent power factor and fifteen pounds per square inch hydrogen pressure in the generator, using a maximum of 370,000 pounds of steam per hour. Generator field excitation is at 250 volt with amplidyne control.

Extraction of steam takes place at the seventh, tenth, thirteenth, and seventeenth stages and supplies steam for regenerative heating in the high pressure heater, the intermediate pressure heater and the evaporators, the deaerator, and the low pressure heater in the order mentioned.

One Floor Operation

In laying out the station, centralization and accessability were given the utmost consideration. As a result, a large portion of the vital equipment is located on one floor. On this floor are located the central electrical and mechanical control room, the turbo-generator, the boiler feed pumps, the traveling water screen drives, the pulverizers, the ash pumps, and the ash sluicing system. Also located here are the forced draft fans, the station air compressor, the control air compressors, the relay and 13,800 volt switchgear room, the spare exciter, and the maintenance shop. Such extensive centralization unquestionably facilitates both operation and maintenance.

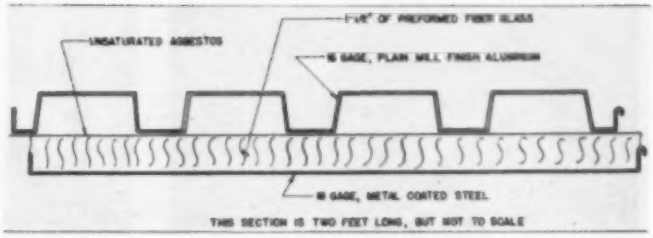
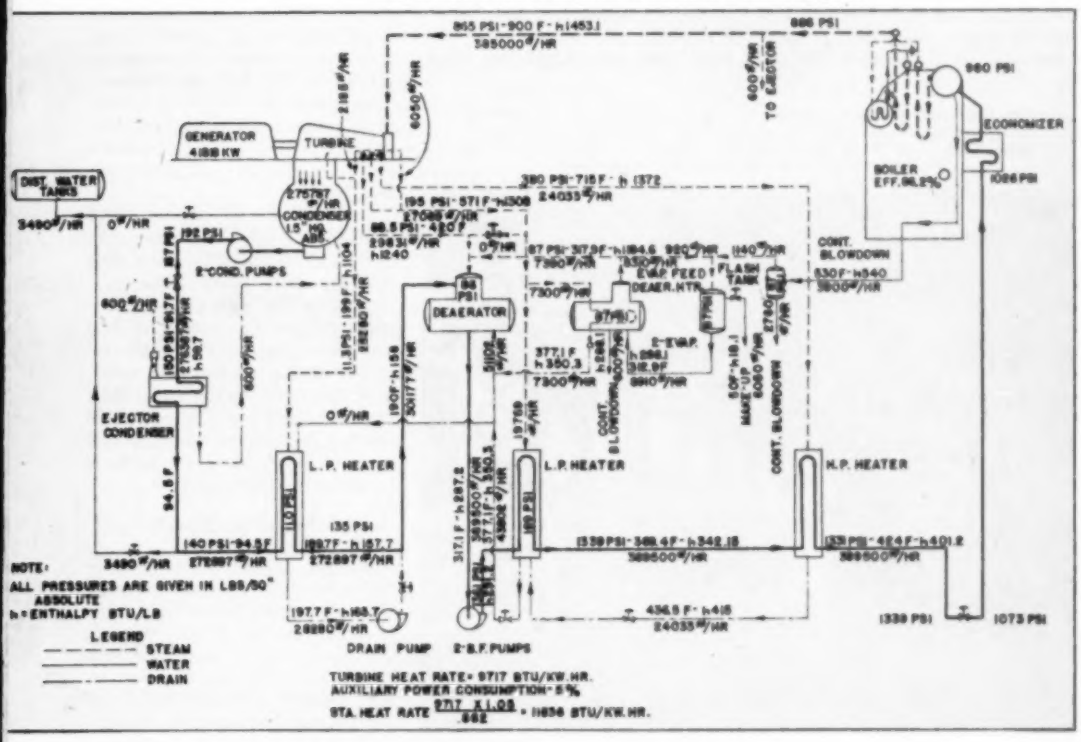

1" OF PREFORMED FIBER GLASS
UNSATURATED ASBESTOS
16 GAGE, PLAIN MILL FINISH ALUMINUM
18 GAGE, METAL COATED STEEL
THIS SECTION IS TWO FEET LONG, BUT NOT TO SCALE

FIG. 4. SECTION OF INSULATED ALUMINUM PANELS USED FOR PLANT WALLS.

Furthermore, with regard to maintenance of other station equipment, it should be noted that as a result of the contour of the land, the railroad siding enters the station at an elevation twenty-five feet above the operating floor. At this higher level are located the coal feeders, the induced draft fans, and easily accessible are the substation transformers, the coal crusher, and other outdoor equipment. Thus, this equipment can be loaded on rail cars, moved inside the station, and lowered to the shop floor by either the one-hundred ton main hook or the fifteen ton auxiliary hook of the turbine hall traveling crane. This crane may also lift condenser

FIG. 5. HEAT BALANCE DIAGRAM AT MAXIMUM THROTTLE FLOW.



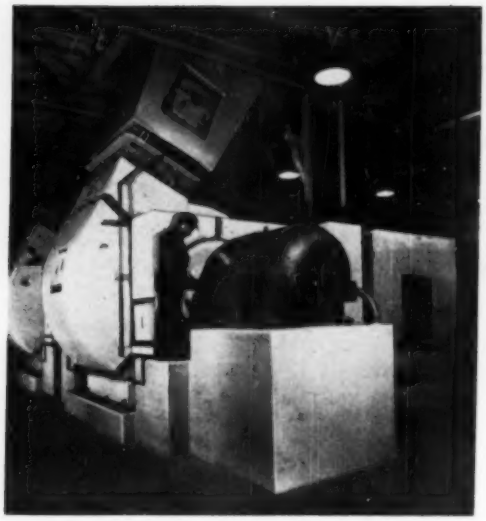


FIG. 7. INDUCED DRAFT FANS.

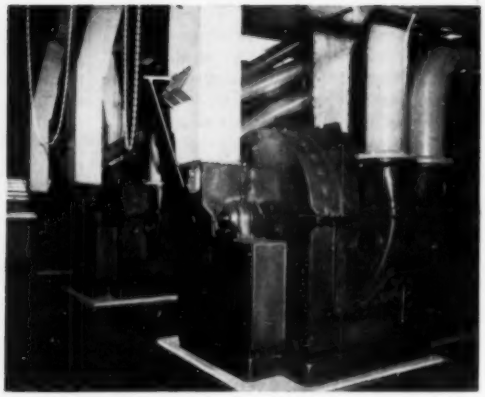


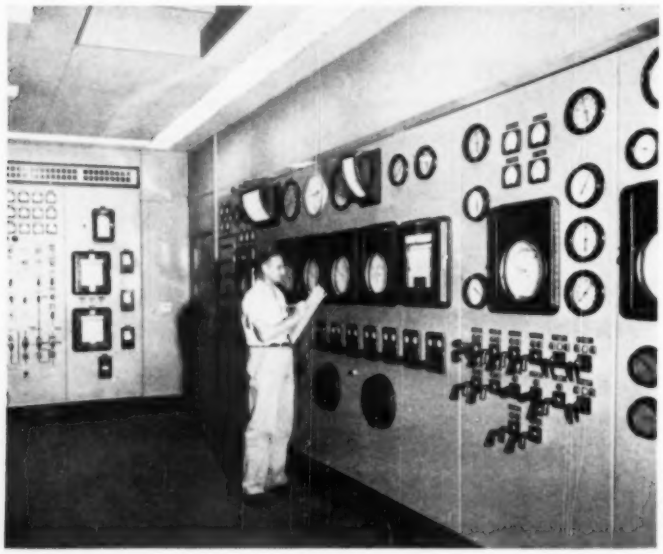
FIG. 8. UNIT COAL PULVERIZERS.

pit equipment through the turbine hall hatchway to the maintenance shop work space.

Three Operators Per Shift

Operation of the station equipment is handled principally by three men: the shift foreman and his assistants, operator "A" and operator "B". Operator "A" is responsible for tending the boiler and its various related equipment. Operator "B" is charged with tending the turbo generator, its related equipment, and with performing switching operations both indoors and out. The shift foreman is directly responsible for the operation of all equipment in the plant and substation. His usual working post is the electrical and mechanical control room from which he can observe the performance of all important operating equipment by means of meters, gages, thermocouples, and other devices. Here too, he can control the operation of these major pieces of equipment by the numerous switches and regulating devices at his disposal. Furthermore, the shift foreman maintains close contact with his operators and the station superintendent's office by means of a public address system.

FIG. 6. FROM THIS ROOM, PERSONNEL CAN AUTOMATICALLY CONTROL ALL MAJOR PIECES OF EQUIPMENT IN THE STATION. HERE ALSO, A CONTINUOUS PERFORMANCE RECORD IS KEPT, AND ANY ABNORMAL CONDITION IS IMMEDIATELY BROUGHT TO THE OPERATOR'S ATTENTION.



Coal handling, testing, and maintenance work are taken care of by additional men on a five day, day shift basis.

Considerable operating experience—frequently under adverse conditions, particularly with regard to the feeding of coal—beginning on August 25, 1949, when the unit was first placed on the line, has proven this minimum assignment of operating posts to be entirely satisfactory.

Station Use Power

Station auxiliaries are fed directly from the generator through the auxiliary transformer and pull-out type air break switches. A ten kilowatt, gasoline-driven motor generator was installed for emergency operation of turbine oil pumps and turning gear. All elec-

trical motors of over seventy-five horsepower are operated from the 2300 volt bus, while all lesser demands are handled on the 440 volt bus. These motors are three phase, sixty cycle, are started directly across the line, and are controlled by 125 volt direct current.

A minimum of conduit was employed for handling station use by the installation of wires in asbestos trays whenever the number of wires being routed in the same direction warranted the arrangement. This not only facilitates maintenance and later handling of these wires, but also contributes some economy. Here too, provision was made for the future installation of additional generating units.

Transmission

Energy generated may leave the station at either or both of two voltages. One transformer converts the 13,800 generator voltage to 132,000 volts for transmission to points at considerable distance from the station. A second transformer changes the generator voltage to 34,500 volts for transmission to points reasonably near the station. In addition, the 34,500 volt transformer is also equipped with a tertiary winding for emergency supply of 2300 volt alternating current to the station auxiliary bus. Necessary differential relay protection is provided for the generator, buses, and transformers with carrier relays for the high voltage transmission lines.

Principal Equipment

Riverton Station—The Potomac Edison Company, Hagerstown, Maryland

STEAM GENERATING EQUIPMENT

Furnace and Boiler .....Riley Stoker Corp., 3 drum with 350,000 lb steam per hr continuous and 385,000 lb steam per hr for peaks. Maximum drum working pressure 1050 lb per sq in. Boiler heating surface 14,210 sq ft, water wall heating surface 12,670 sq ft. Furnace 25 ft 3⅝ in. wide, 20 ft 4⅛ in. deep, volume 21,170 cu ft. Heat release at 350,000 lb steam 20,800 Btu per cu ft. Maximum overall efficiency is 87.3%.

Burners .....Six—Riley Stoker Corp., horizontal flare type forced draft.

Superheater .....Riley Stoker Corp., 2-stage, vertical, loop high velocity, convection type; steam temperature at outlet 900 F.

Economizer .....Riley Stoker Corp., continuous tube type with 4000 sq ft heating surface.

Air Preheater .....Riley Stoker Corp., 2 section, vertical, welded tube type. Heating surface—low temperature section 38,000 sq ft, high temperature section 24,000 sq ft.

Pulverizers .....Three—Riley Stoker Corp., No. 5 duplex Atrita with low rating dampers. Capacity 15,600 lb coal per hr with 8% moisture and 50 Hardgrove grindability. Drive—Westinghouse 250 hp, 900 rpm, 2300 v, 3 phase, constant speed.

Forced Draft Fans .....Two—Green Fuel Economizer Co., full housed, double inlet, vane controlled. Capacity—63,000 cfm at 29.92 in. of mercury barometer, 100 F, 10.5 in. of water gage static pressure. Drive—General Electric Co. 150 hp, 1800 rpm, 2300 v, 3 phase constant speed.

Induced Draft Fans .....Two—Green Fuel Economizer Co., full housing, double inlet vane controlled. Capacity 100,600 cfm at 29.92 in. of mercury barometer, 300 F, 10.5 in. of water gage static pressure. Drive—General Electric Co. 400 hp, 900 rpm, 2300 v, 3 phase, constant speed.

TURBINE GENERATOR EQUIPMENT

Turbine Generator .....General Electric Co., 34,500 kw 3600 rpm, impulse reaction, 19 stage, single cylinder, condensing type with 4 extraction points. Inlet steam—900 F, 850 psig. Exhaust pressure 1.5 in. of mercury absolute. Turbine drives a General Electric 3600 rpm, 43,125 kva at 80% power factor, 3 phase, 60 cycle, 13,800 v, hydrogen cooled generator. (15 psig hydrogen pressure). Main exciter 250 v with amplidyne control.

Condenser .....Foster Wheeler Corp., 27,500 sq ft, 30,000 gpm, 2 pass, cross flow, divided water box type, 5450 Admiralty tubes, ⅞ in. O.D., No. 18 BWG, 22 ft effective length.

Circulating Water Pumps ....Two—Foster Wheeler Corp., 19,500 gpm maximum, vertical, mixed flow against 31 ft head. Driven by Westinghouse Electric Corp. 150 hp, 600 rpm, 2300 v, 3 phase constant speed motor.

Steam Jet Air Ejector .....Foster Wheeler Corp., combined 2 pass intermediate and after condenser with 2 stage, steam jet ejectors requiring 600 lb steam per hr at 400 psig. Also Foster Wheeler Corp., hogging jet.

CONDENSATE AND FEEDWATER SYSTEM

Condensate Pumps .....Two—Foster Wheeler Corp., 665 gal, 3 stage, vertical type. Driven by Westinghouse Electric Corp. 125 hp, 1800 rpm, 2300 v, 3 phase, 60 cycle constant speed motor.

Boiler Feed Pumps .....Two—Allis-Chalmers Mfg. Co., 5 stage, 805 gpm against 3000 ft head. Driven by Allis-Chalmers 900 hp, 3600 rpm, 2300 v, 60 cycle, 3 phase, constant speed motor.

Low Pressure Feedwater Heater .....American Locomotive Co., with 220 Admiralty "U" tubes, ⅝ in. O.D., No. 18 BWG, 160 in. length, 1165 sq ft effective surface. Maximum capacity 28,100 lb steam per hr, 272,897 lb of feedwater per hr.

Intermediate Feedwater Heater..American Locomotive Co., with 210 Monel "U" tubes, ⅝ in. O.D., No. 18 BWG, 199 in. length, 1150 sq ft effective surface. Maximum capacity 43,100 lb of steam per hr, 389,500 lb of feedwater per hr.

High Pressure Feedwater Heater .....American Locomotive Co., with 170 Monel "U" tubes, ⅝ in. O.D., No. 18 BWG, 199 in. length, 932 sq ft effective surface. Maximum capacity 24,000 lb steam per hr, 389,500 lb of feedwater per hr.

Evaporators .....Two—Griscom Russell Co., with 216 sq ft gross surface, 36 sq ft disengaging surface, tubes—¾ in. O.D., No. 18 BWG, seamless drawn 80-20 copper-nickel, 8 ft long. Capacity—7550 lb per hr gross vapor of which 1550 lb is fed to evaporator preheater leaving 6000 lb per hr net make-up.

Deaerator .....Elliott Company, 400,000 lb per hr capacity with 12,000 gal storage and 256 sq ft single pass vent condenser. Supplied with steam from 13 stage, effluent not to contain more than 0.005 cc of oxygen per liter.

ELECTRICAL EQUIPMENT

Main Power Transformer ....Westinghouse Electric Corp., 30,000 kva outdoor type, oil insulated, 3 phase, 60 cycle, forced air-forced oil cooling, 13,200 v delta to 132,000 v star.

Main Power Transformer ....Westinghouse Electric Corp., 20,000 kva outdoor type, oil insulated, 3 phase, 60 cycle, forced air-forced oil cooling, 13,200 v star to 34,500 v star with 2,300 v delta tertiary.

Station Service Transformer..Westinghouse Electric Corp., 5,000 kva outdoor type, oil insulated, self cooled, 3 phase, 60 cycle, 13,800 v star to 2,400 v delta.

13,800 Volt Switchgear .....General Electric Co., type ARA-15-1500 air blast circuit breakers, 13,800 v, 2000 amp, 3 phase, 60 cycle, 1,500,000 kva interrupting capacity.

2,300 Volt Switchgear .....Westinghouse Electric Corp., type 50-DH-100 air circuit breakers, 100,000 kva interrupting rating, 3 phase, 60 cycle, 2300 v, 600 amp, with 1200 amp main supply breakers.

440 Volt Switchgear .....I.T.E. Circuit Breaker Co., type KB air circuit breakers with 2—300 kva, 2400-480 v, 3 phase air cooled transformers.

132,000 Volt Switchgear .....Six — Westinghouse Electric Corp., type GM2, outdoor, floor mounted, De-ion grid, 138 kva, 800 amp, 1,500,000 kva interrupting capacity, electro-pneumatically operated oil circuit breakers.

How to Maintain Industrial Controls

By W. P. Patrick
Control Division
General Electric Co.
Schenectady, N. Y.

PART 2
TOOLS AND PROCEDURES

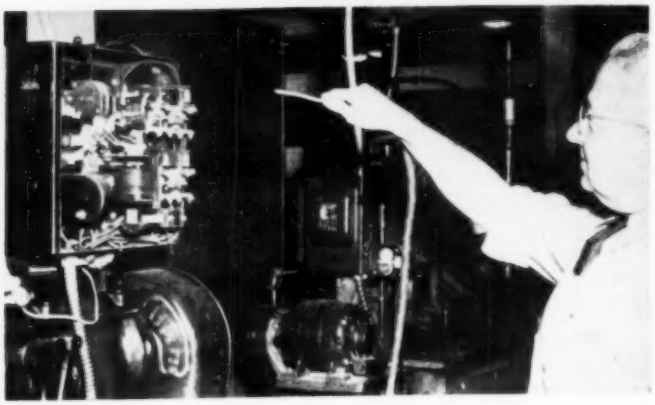


FIG. 1. BLOWING DUST FROM A D-C REVERSING DYNAMIC-BREAKING MACHINE TOOL CONTROLLER.

Part 1 of this series in the May issue covered inspection schedules. This article deals with tools and procedures. The final installment in July will outline trouble shooting methods.

AN important factor to consider in establishing an inspection program is that of making available the necessary tools to do the job efficiently. These tools may be nothing more than a screw driver, adjustable wrench, portable ammeter, and voltmeter, or more elaborate testing equipment may be required. However, in the final analysis, the tools and test equipment required depend on several factors, such as: the number of equipments involved, the type of equipment being serviced, and the importance of service continuity to the productivity of the plant.

The following list of tools for consideration is divided into two groups, namely: Industrial Manual and Magnetic Control, and Industrial Electronic Control:

Tools for Maintenance of Controls

MANUAL AND MAGNETIC CONTROL

Multimeter

Instruments of the multimeter type can be obtained which will read a-c and d-c volts. It is recommended in selecting a meter of this type that it should have at least 5000 ohms per volt. It should also have facilities for reading approximate resistance values.

Portable Ammeters

In considering a-c and d-c ammeters, it is advisable to use multi-scale meters, the range of these scales being dependent on the type of equipment involved.

To make these meters most effective, portable current transformers for a-c equipment and portable shunts for d-c equipment should be considered.

Portable Voltmeters

Again, as in the case of ammeters, multi-scale volt meters should be considered. The number of scales required, again, is mainly dependent on the type of equipment involved and the power supply available. However, a triple scale meter rated 150/300/600 volts is usually flexible enough to take care of most conditions.

ELECTRONIC CONTROL

Multimeter

The multimeter should be capable of reading a-c and d-c volts with at least 5000 ohms per volt. It should also have facilities for reading approximate resistance values.

Oscilloscopes

The cathode ray oscilloscope should be portable, simple to operate, and preferably modified to read

d-c voltages directly on the plate. A 2" or 3" tube is ideal for maintenance and trouble shooting. Oscilloscopes using a 5" tube are useful in a laboratory, but are too heavy and large for use on a job. Several good models are on the market now but must be modified to read d-c voltages. This modification is an absolute necessity for work on industrial electronic equipment. The cathode ray oscilloscope is one of the most versatile and perhaps the least understood instruments available.

The single element magnetic oscilloscope is ideal for accurately reading peak values of current, even if only of high cycle duration. It is also the best instrument for determining the balance or magnitude of unbalance of a-c transient current.

Vacuum Tube Voltmeter

The vacuum tube voltmeter in its present commercial form will do better the same work done by the standard multimeter. It costs more and must be connected to a-c power which sometimes limits its usefulness and flexibility. On many low energy and high impedance circuits it is the only instrument that can be used successfully.

Ammeters

The early current transformer and ammeter or the combined hook-on type of instrument is essential in checking the line current of resistance welding machines, or other a-c loads associated with electronic control. The instrument should be provided with a pointer stop so that current values of short duration can be measured.

Radio Tube Checker

This instrument is useful and worth-while in large plants where considerable electronic control equipment is used. It is limited to radio receiver tubes and must be kept up to date to take care of new tubes as they are put out by the tube manufacturers.

Industrial Tube Checker

This is a tube tester for mercury and gas-filled tubes designed to measure the arc drop of the tube while passing short pulses of current. The arc drop of a Thyratron or Phanotron is a measure of the cathode emission, which is the expendable part of a Thyratron or Phanotron.

MAINTENANCE PROCEDURES

Cleaning

If heavy dust or grease has accumulated on any part of the control equipment, it should be removed with a heavy brush or wooden scraper. Dry dust and similar accumulations should be blown off. Dry compressed air, if available, can be used to accomplish this purpose. See Figure 1. This is important, as dust may not only prevent the control devices from operating normally, but it also may contain conducting materials which will ultimately form a path between points of different potential, resulting in short circuits. Dust on the surfaces of interlocks may prevent a circuit, particularly, if it happens to be a low voltage circuit, from being completed, even though the contacts are in the closed position. Grease, oil or sticky film, is easily removed when a cleaning fluid, such as common tetrachloride is used. Parts, particularly the coils, should not be soaked with a cleaner, but just enough used to loosen the grease or film, so that it can be wiped off. For cleaning small parts, a small paint brush is very convenient for getting into otherwise inaccessible corners and crevices. If cleaning fluid is necessary in such locations, it is suggested that the brush be dipped into the cleaning solution and then applied to the parts to be cleaned.

Fuses

While most fuse clips and fuse ferrules are plated to resist corrosion, it is well to occasionally remove the fuse from the clip and polish the contact surfaces. Silver plated clips and ferrules, however, do not require polishing. In replacing the fuses, care should be taken that they fit snugly into the clips.

How to Care for Contacts

In normal service contacts are subject to wear. Every time a circuit is opened under load, the cur-

FIG. 2. CONTACT TIPS THAT ARE BURNED AND ROUGH AS SHOWN AT LEFT AND IN CENTER WILL CONTINUE TO OPERATE SATISFACTORILY AND NEED NOT BE REPLACED. THE WORN CONTACTS SHOWN AT RIGHT FROM A MAGNETIC SWITCH ARE ALSO STILL SERVICEABLE.

FIG. 3. CONTACTS FROM A MAGNETIC SWITCH, AFTER HAVING BEEN OPERATED WHEN OUT OF ALIGNMENT.

rent which is being interrupted causes arcing which burns off contact material, and in the process causes roughening of the contact surface.

A sometimes mistaken impression is that contacts which have been roughened by ordinary service, should be kept smooth to perform most efficiently. Actually, a roughened contact will carry current just as well as a smooth contact. Figures 2 and 2-A show the appearance of a contact which has been roughened in normal service. Of course, if a large projection should appear on the contact, because of unusual arcing, it should be removed.

Do not lubricate the current carrying surface of contacts. The burning of oil when the circuit is interrupted increases the heating of the contacts and in general tends to shorten their life.

To obtain good contact performance it is essential to keep them properly adjusted. The manufacturer's instruction book will explain these adjustments and suggest when contacts should be replaced. Contacts shown in Figure 3 illustrate when contacts should be replaced. Also Figure 4 illustrates what happens when contacts have not been serviced and the ensuing damage to other parts of the device.

As the contact wears, pressure is maintained by the wiping spring, which presses the movable contact against the stationary contacts when the contact is in its closed position. This spring should be checked at intervals, since contact heating may tend to anneal the spring with resultant reduced contact pressures. Should this condition go unnoticed, it may ultimately result in lowering the tip contact pressures to a point at which the contacts may freeze.

A good method of checking contact pressure without having specific information on a given device, is to compare the contact pressure with that of other contacts of the same device. The spring pressures on all contacts should be approximately the same and if it is found that one is considerably lower than the others, then, the spring should be replaced.

Figure 5 illustrates "tip gap" and wear allowance. A term commonly associated with contactors and relays is "wipe". The actual definition of "wipe" as used in this sense, is sometimes misunderstood. To avoid any misunderstanding, "wipe" can best be defined as the total depth of contact material that

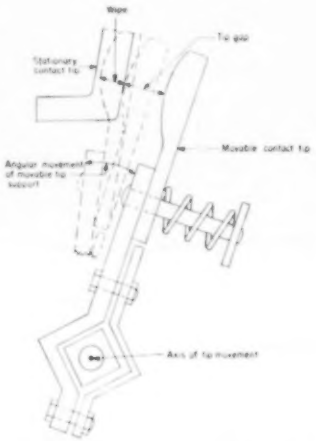
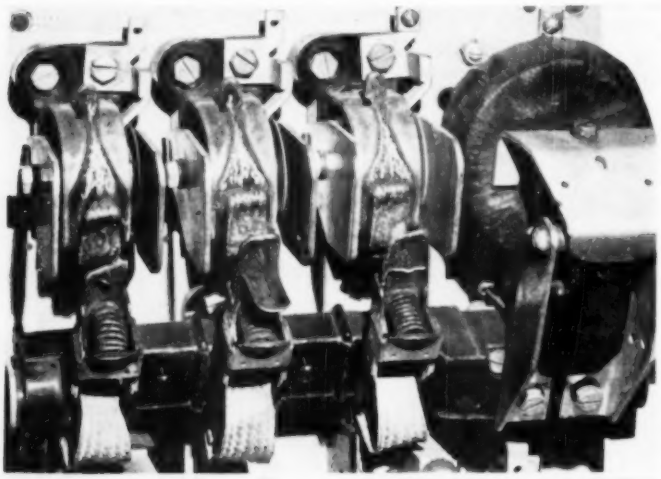


FIG. 5. DIAGRAM FOR CONTACTS AND RELAYS, SHOWING CONTACT WIPE AND GAP.

FIG. 4. RESULTS OF FAILING TO REPLACE PARTS OF A MAGNETIC SWITCH WHEN REPLACEMENT WAS DUE.



can be worn away before the contacts fail to make contact when the contacts are closed. It does not pertain to the sliding or rolling of any of the parts. By virtue of this "wipe" the total pressure exerted by the movable contacts builds up in accordance with the pressure of the contact spring. When the contact materials have worn away, reducing this contact pressure to a minimum value, it is recommended that the tips be replaced.

Wear allowance and wipe are entirely different, although often used synonomously. Perhaps there may be 50% wipe remaining when the maximum wear allowance has been reached. In practice, wear allowance is not directly computed from contact dimensions and travel. Usually the instruction sheet for a given device shows how to measure wear allowance between two points which are readily accessible. When the wear allowance has been reduced to the specified

minimum, the contacts should be replaced.

Copper Contacts

Copper contacts oxidize very rapidly at elevated temperatures and more slowly at room temperatures. As the copper oxide which is formed has a very high resistance, it is necessary to keep these contacts free from oxidation. In general, however, it is usually unnecessary to file the copper contacts if the device is operated fairly frequently. The slight abrasion or rubbing action produced by the closing operation is generally sufficient to keep the oxide formation under control so that it does not interfere with satisfactory operation. However, if it is not sufficient, then they can be cleaned with a few strokes of a 6" mill file. Do not file any more than necessary because filing removes contact material and reduces contact life.

Silver Contacts

Many small contactors and relays are fitted with fine silver contacts, which oxidize more slowly than copper contacts. Silver oxide has the characteristic of being self-reducing. Therefore, it is not necessary to file silver contacts to remove any oxide which might be apparent. In fact, to the contrary, silver contacts should not be filed because on some devices the silver is nothing more than a very thin insert and very little filing can destroy them completely.

Care of Magnet Coils

Coils for a-c magnets are usually designed to operate satisfactorily between 85% and 110% of rated voltage, and coils for d-c magnets are usually designed to operate satisfactorily between 80% and 110% of rated voltage. When operated within these limits, the coil temperature rise for class A insulation (standard) should not exceed 85 C measured by resistance in ambients up to 40 C. The equivalent temperature rise when measured by thermometer on the coil surface would be 65 C. It is important to see that coils are operated within these limits because it is estimated that for each additional 15 C rise the coil life is halved.

The common causes of coil failures are: (1) overheating and (2) mechanical failure.

Overheating of the coil can be caused by many factors such as: high ambient temperatures, restricted ventilation, shorted turns due to vibration, failure of insulation on coil wire, or too frequent operation (very rapid jogging of a-c magnets).

Another cause of coils overheating on a-c magnets is the failure of the magnet to seal upon being energized. The reason for this is that the coil current for a-c magnets is at its minimum value when the armature seals properly with the frame. If the gap between the armature and frame is greater than normal, the coil impedance is lowered and the result is higher coil current.

Mechanical failures are usually the result of excessive vibration which cause the coil wire (particularly if it is fine) to break, or it may cause the connection between the terminals or leads and the coil wire to be broken.

In handling coils, care should be taken not to stress the connection between the coil terminals or leads and the coil wire because it may result in a break or a partial break which will cause the coil to fail shortly after being put in service. This damage can be very easily done by using coil leads for handles when carrying coils.

Should it be necessary at any time to dry coils which have been exposed to excess moisture, they should be thoroughly baked as soon as possible in an oven at a temperature ranging from 110 C to 125 C. In assembling coils in the magnet frame, be sure to fasten them securely.

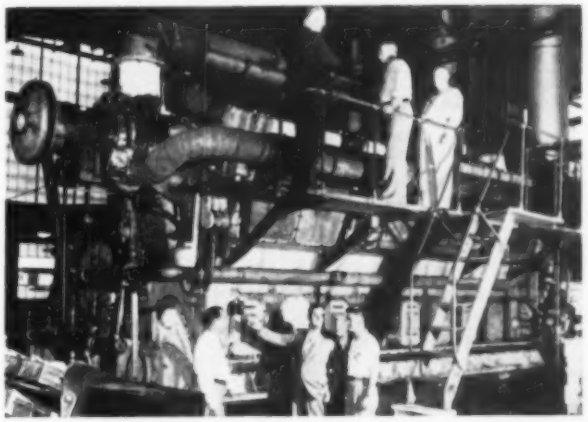
The final article of this series which will appear in the July issue will discuss trouble shooting procedures.

Tri-Fuel Engines for Missouri Cooperative

Tri-fuel engines are being installed at the $2,900,000 M & A Electric Cooperative generating plant in Poplar Bluffs, Missouri. This first unit is known as the LSV-16 Cooper-Bessemer, and develops over 3400 hp.

It is the first engine of its kind in the world to operate entirely on Diesel fuel oil, on natural gas alone, or in any combination of fuel oil and gas.

On the engine platform is W. Crooks, Cooper-Bessemer's engineering representative talking with Glenn Eakers and H. C. Knappenberger of M & A. At base of machine is Carl Vaupel, assistant general manager of Cooper-Bessemer; William Arthur, Cooper-Bessemer St. Louis representative; and J. Owens, manager of M & A Cooperative.



Screwed Vs. Welded Piping—

Kentucky brewery expansion, including new power plant, steam distribution system, and bottling plant, offers comparative costs of fabrication for welded and screwed and flanged construction.

By Charles A. Schott
Chief Engineer
Frank Fehr Brewing Co.
Louisville, Ky.

ENGINEERS generally have been prone to make assumptions regarding the costs of piping fabrication without obtaining factual data on which to base their conclusions. Until quite recently, welded piping was associated with large high-pressure plants and engineers in the smaller plants assumed that a welded job was more expensive than the same line would be when screwed or flanged. We all realize that the subject of fabrication costs for piping is a very controversial one; and until recently, factual data was seldom available.

At the Frank Fehr Brewing Company, we have been engaged in an extensive expansion program, and therefore wished to obtain factual data on which to base the selection of fabrication methods for all our pipe work. We were well aware of the fact that both labor and materials were substantially higher since the recent war, and that the cost of piping is no small item in the construction of new plants. We also realized that maintenance is of great importance.

Boiler Plant

An increase in production in our plant made it imperative to place a new boiler plant in operation at the earliest possible date to meet increased demand for steam. We specified that all lines 2-in. and larger were to be welded, except the city water lines. This job gave us a splendid opportunity to determine comparative costs of fabrication for welded, screwed, and flanged construction.

We timed welders at work with a stop watch (without their knowledge) to obtain the time required for making cuts and welds for various sizes of pipe. We timed different welders on each type of job and on several sizes of pipe. With the cooperation of the contractor, we arranged to switch the welders from job to job, and from size to size, so that we would get an accurate record of the time required. We followed the same procedure on threaded and flanged lines and obtained the data shown in Table I.

When the boiler plant was finished and placed in service, we did not have a single leak in the welded lines. However, we did have a number of leaks in the threaded pipe which required additional work and expense. An allowance for this additional cost, in our opinion, should be added to the installation cost of the piping system. In some instances, this additional expense amounted to 15 per cent of the original cost of the piping as most of the thread leaks were in inaccessible places.

Bottling Plant

The next project was a complete new bottling plant. After analysing the data obtained for the power plant, we specified that all piping was to be welded except a 6-in. water line. We continued our survey and collected data throughout the project.

First, we secured bids from a piping contractor on the steam piping for both welded and threaded

TABLE I

Time for Various Operations in Minutes
Standard Weight Pipe*

Size of Pipe	Welding* in Position	Threading at High Speed	Cutting	Welding* Branch Connection
½"	14	7	4	21
1¼"	14	9	4	21
2"	14	10	4	21
2½"	15	11	5	22
3"	16	13	5	24
4"	18	15	6	27
6"	31	20	7	46
8"	40	28	13	60
10"	46	33	16	63
12"	58	40	20	87

Time required—Tacking and Welding only. Does not include material handling, setup or erection time.
*For welding extra heavy pipe increase time by 20%.

THE FRANK FEHR BREWING CO. EXPANSION INCLUDED A NEW BOILER PLANT. ALL LINES, 2-IN. AND LARGER WERE WELDED, EXCEPT THE CITY WATER LINE. WITH THE COOPERATION OF THE CONTRACTOR, FEHR ENGINEERS ARRANGED TO SWITCH THE WELDERS FROM JOB TO JOB, AND FROM SIZE TO SIZE TO SECURE AN ACCURATE RECORD OF THE TIME REQUIRED. THE SAME PROCEDURE WAS FOLLOWED ON THREADED AND FLANGED LINES.

*Adapted from a paper presented at the 12th Annual Midwest Power Conference in Chicago.

ALL PIPING IN FEHR'S NEW BOTTLING PLANT WAS WELDED EXCEPT A 6-IN. WATER LINE. TABLE II IS THE CONTRACTOR'S FABRICATING ESTIMATE AND TABLE III THE CONTRACTOR'S INSULATING ESTIMATE. COST OF INSULATION OF THE PIPING IS THE SAME IN BOTH CASES. HOWEVER, INSULATION FOR FLANGES ON THE SCREWED JOB MUST ALSO BE CONSIDERED. ADDITIONAL CHARGES ON THE JOB WERE $634.

TABLE II

Comparative Cost Data
Contractor's Fabricating Estimate

	EXTRA HEAVY PIPE		STANDARD PIPE	
	Welded	Screwed	Welded	Screwed
Valves	950.23	950.23	661.27	661.27
Pipe	537.20	537.20	431.25	431.25
Gaskets	156.54	156.54	156.54	156.54
Welding Material	28.80	.....	26.00	.....
Fittings	479.79	648.33	369.81	344.10
Labor	2,096.32	1,816.80	2,070.00	1,816.80
Total	**4,248.88**	4,109.10	**3,714.87**	3,409.96

TABLE III

Comparative Cost Data
Contractor's Insulating Estimate

	EXTRA HEAVY PIPE		STANDARD PIPE	
	Welded	Screwed	Welded	Screwed
Valves	950.23	950.23	661.27	661.27
Pipe	537.20	537.20	431.25	431.25
Gaskets	156.54	156.54	156.54	156.54
Welding Material	28.80	.....	26.00	.....
Fittings	479.79	648.33	369.81	344.10
Labor	2,096.32	1,816.80	2,070.00	1,816.80
Pipe Insulation	726.00	726.00	726.00	726.00
Flange Insulation	.....	634.00	.....	634.00
Total	4,974.88	**5,469.10**	4,440.87	**4,769.96**
	Welding Saved $494.22		Welding Saved $329.09	

construction. Conclusions drawn from this project were reported in the June 1949 issue of **National Engineer**, and the data presented here somewhat parallels the foregoing article. However, we have since secured additional information so that this survey is far more complete.

Table II summarizes the contractor's estimate and shows that the cost of a welded job in each case would be somewhat higher as indicated by the figures in bold face type. However, we must keep in mind the possibility of additional costs due to leakage in the screwed piping system, so that, in our opinion, there is little or no difference in the initial cost of the piping.

We next secured an estimate on insulating this line for both types of construction, since obviously the costs of insulation must be included on steam lines. The results of this survey and the comparative costs of the two types of construction are shown in Table III.

The cost of insulation of the straight run piping is the same, $726.00; however, the flanges on the screwed job, normally used on 4 in. or larger piping, must also be considered additionally. We had an additional charge of $634.00 for insulation on the flanges only. These estimates are for a typical industrial piping job. Pipes sizes ranged from 2 to 12-in., and we believe that this tabulation gives a very good over-all picture of the comparative costs between welded, threaded, and flanged construction.

Table IV is of interest since it summarizes the time required for cutting and welding, and cutting and threading pipe for the two types of construction, and is a breakdown of the work required on this project. The contractor shows that 52 hours are required for cuts and threads on the screwed job, and 55 hours for cuts and welds on the welded line. Obviously there can be little or no difference between the two

THIS IS AN ISOMETRIC DRAWING OF THE PIPING FOR A 200 TON AMMONIA COMPRESSOR. IN SPITE OF THE FACT THAT THERE ARE SOME ODD ANGLES IN THE SYSTEM, THE INSTALLATION IS VERY NEAT. THE COST OF THE JOB WOULD HAVE BEEN $276 HIGHER IF THE FLANGED SYSTEMS WERE EMPLOYED. ALL OF FEHR'S REFRIGERATION PIPING IS WELDED REGARDLESS OF SIZE, BECAUSE REFRIGERANT LEAKS ARE DANGEROUS AND EXPENSIVE.

INSTALLATION PIPING
FOR
AMMONIA COMPRESSOR

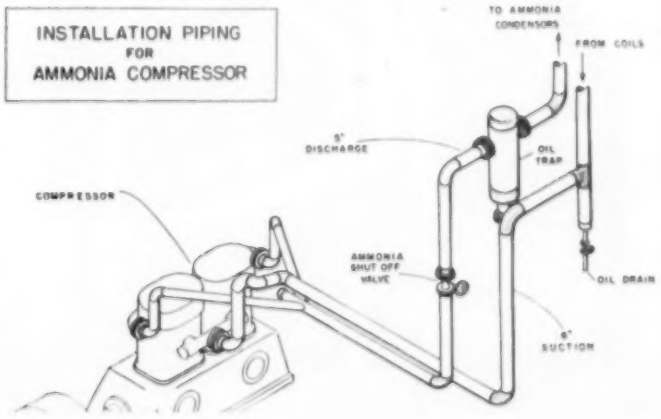


TABLE IV

Total Labor Required

Size	WELDED CONSTRUCTION						THREADED CONSTRUCTION					
	No. of Cuts	Minutes Per Cut	Minutes Total Time	No. of Butt Welds	Min. Per Weld	Total Time	No. of Cuts	Minutes Per Cut	Minutes Total Time	Number of Threads	Minutes Per Thread	Total Time
1"	10	4	40	6	14	84	8	4	32	4	7	28
1½"	18	4	72	16	14	224	12	4	48	8	9	72
2"	20	4	80	19	14	226	16	4	64	16	10	160
2½"	11	5	66	10	15	150	6	5	30	6	11	66
3"	22	5	110	19	16	304	20	5	100	20	13	260
4"	12	6	72	22	18	396	18	6	108	27	15	405
5"	37	7	259	39	24	936	48	7	336	54	20	1080
12"	3	20	60	3	48	174	6	20	120	6	40	240
Total			759			2534			838			2311

Arc Welded

Cuts ..... 759 minutes
Butt Welds ..... 2534 minutes
3293 minutes
or **55** hrs.

Threaded

Cuts ..... 838 minutes
Threads ..... 2311 minutes
3149 minutes
or **52** hrs.

THIS SUMMARY OF THE TIME REQUIRED FOR CUTTING AND WELDING, AND CUTTING AND THREADING PIPE FOR THE TWO TYPES OF CONSTRUCTION INDICATES THAT THERE IS LITTLE DIFFERENCE IN LABOR COST BETWEEN THE TWO METHODS OF CONSTRUCTION AND EACH JOB WOULD REQUIRE ABOUT 80 MAN DAYS. HOWEVER, THE MANY ADVANTAGES OF WELDED CONSTRUCTION POINTED OUT IN THIS ARTICLE LED TO WELDED CONSTRUCTION

methods of construction, and oddly enough each job would require about 80 man days.

In our opinion, one of the important things to keep in mind is that once a joint is properly welded it is just as strong as the pipe itself, and there is no chance of future leaks. This has been our experience on every welded job. There is no future maintenance cost for repairing leaks, whereas we have found continual maintenance on our threaded lines. As we all know, a piping system normally gives out first at the threaded joint therefore the life of our lines will be substantially longer because of welded construction.

I know of one instance during the war where a flanged line had to be replaced. After careful inspection and physical testing of the 8-in. pipe, the engineer in charge found that all that was required was to cut approximately a foot off of each section at the flanged joint and weld the line. In his opinion, a welded line in normal service will last at least twice as long as any line where threaded joints are involved.

Since all of our new steam piping is welded, we now repair leaks in the threaded lines by cutting out the leaking fitting and install a welded fitting in its place. This practice has brought about a very noticeable saving in steam since there is no leakage through welded joints.

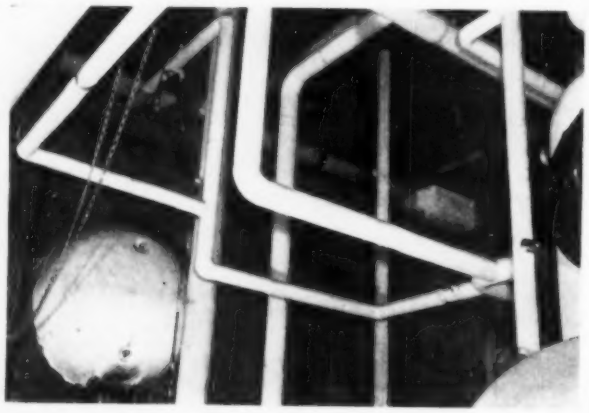
Another point which should be considered in any comparison of costs is the presence of bends requiring the use of other than standard fittings. These are no problem when the line is welded, but with screwed construction odd angles can only be made up with the use of a swing joint and we have found such joints to be a source of trouble.

Perhaps the most important single factor in determining

Typical Fehr Piping Network

You'll have to look hard to find any screwed fitting in this network of piping in the new steam and bottling plants of the Frank Fehr Brewing Company.

All lines, down to ½-in., are fabricated with welded fittings. This means there are no shutdowns due to joint failures, no expensive losses of pressure and product.



whether or not to weld piping is the availability of good welders. Since the war however there are well-trained men available in nearly every industrial area. Since a welded line is no better than the welder, availability of workmen is a factor which must be considered.

Check List

Factors to be considered by the plant engineer in deciding the type of construction to employ are:

Will the pipe lines be a permanent installation? Welded joints will last as long as the pipe itself.

What material will the line handle? What is the line to be used for? Will leakage be expensive? Remember that steam, ammonia and many other gases are difficult to hold and expensive to replace.

Are the lines to be insulated? This is a very important factor. We have shown that when lines are to be insulated, welding is usually the least expensive in initial cost. Today most plants insulate nearly all of their lines. When a leak occurs the insulation is damaged and must be replaced in addition to repairing the line so, again the cost of maintenance is a definite factor.

What is the size of the piping? In our experience the larger the line the greater the saving with welded construction. Our standard practice is to weld all lines 2-in. and larger because the final cost to the plant is reduced.

Advantages of Welded Construction

To summarize, here are the points which brought about the decision to standardize on welded construction for our plant:

1. A welded pipe line is much neater in appearance.
2. A welded pipe line is stronger.
3. There is little or no maintenance on a welded line.
4. Delays in placing a new pipe system in service are avoided with welded construction.
5. The initial cost of welding joints is cheaper than other forms of construction on all lines 4-in. or larger. When all factors such as maintenance and leakage are considered, welding offers a very definite advantage in sizes down to 2-in. on all services, and in the case of refrigerant lines, welding or brazing should be employed regardless of size.

South's Largest Pipe Factory

(Smoking Pipes, that is)

SPARTA Pipes, Inc., located high in the mountains of North Carolina near the town of Sparta, is the largest manufacturer of tobacco pipes in the South. E. A. Darr, Jr., General Manager, and Austin Miller, Superintendent, have been operating the plant since 1942. All of the pipes made here are cut from imported briar, and they are distributed throughout the country. The photograph at left shows two of the employees applying a special chemical to the interior of the pipe bowls. This helps "breaking in" of the pipe.

4200 Hour Service Report on O G & E's First Central Station Gas Turbine ——

Recent inspection indicates unit has a reliability at least comparable to the best steam turbine records. Installation has been surprisingly free of "bugs" ordinarily experienced in starting any new equipment. Minor difficulties were not unusual or in any way attributable to the gas turbine design or operation.

FOUR months' detailed operating data on the 3500 kw, General Electric simple-cycle gas turbine in Oklahoma Gas and Electric Company's Arthur S. Huey Station at Oklahoma City, was presented in the December, 1949 issue of SOUTHERN POWER AND INDUSTRY. In more than 1500 operating hours, the turbine had produced approximately 5¼ million kilowatt hours at an average of 3557 kilowatts.

At the recent A.S.M.E. Region VIII meeting in Dallas, Texas, Mr. Otis Howard, manager of operation for Oklahoma Gas and Electric, discussed "Operating Results of Gas Turbines", including informative data on a recent 4200 hour inspection.

Unit Dismantled

In his discussion, Mr. Howard stated that the gas turbine unit was removed from service in February, completely dismantled, and thoroughly inspected. The rotating parts were given the "Zyglo" test, with no evidence of defects. As there has not been a single, forced shutdown of the unit to date, this indicates that it has a reliability at least comparable to the best steam turbine records.

The entire installation has been surprisingly free of "bugs" ordinarily experienced in starting any new equipment. There have been a few items such as, oil pump packing trouble, guide vane failures in exhaust ducts, thermocouple deterioration, oil deflector leaks, usual oil leaks around governor, gas control valve sticking, exhaust temperature control bulb leak, and other very minor difficulties; none of which were unusual or in any way attributable to the gas turbine design or operation.

"The most difficult situation we have had to cope with is the movement of the exhaust connection on the duct work to the waste heat boiler due to expansion and contraction. The exhaust connection, which has nothing whatever to do with the turbine design, is a very irregular piece of duct, such irregularity being determined by the relative location of the turbine, design of the building and waste boiler. The resultant movement under the high temperature consists of a twisting motion at the turbine exhaust connection. Much design effort and experimentation with bellows type expansion joints, etc., have been directed toward the solution of this difficulty. We have only recently concluded that this can be solved only by an extremely flexible joint of heat resisting fabric. We have been able to operate to date with a sliding joint, which has the usual objections of appearance, leakage, etc.

"As might be expected, a few bolts in the hot region of the turbine were lost during the February dismantling, but even so, the number was less than is usually experienced in dismantling steam turbines. Based on operating experience to date and, of course, subject to suggestions from the General Electric Company, we expect to operate this unit at least a year at full load before another major overhaul."

As always happens in a "first" application of this sort, a number of unexpected situations arose. The first and most important difficulty, Mr. Howard stated, was the expansion trouble already described. "This, of course, could have been anticipated had we been able to apply known formulae to the duct design.

Compressor Capacity

"A second condition was less susceptible to pre-operation analysis. After a few months' operation the compressor capacity began to fall off, indicating fouling. However, outside of a slight loss in capacity the operation was fully satisfactory. The compressor was finally opened and a dirt deposit was found on both rotor and stator blading in the first 75 per cent of the inlet end of the compressor. This was easily cleaned and the unit was put back in service with its capacity restored.

"As the unit uses unfiltered air, an enormous amount of dust passes through it. It was obvious that oil from some source was acting as a binder, thereby retaining the dust on the blades. Porous castings, oil seals, etc., were immediately suspected, but it was finally determined that the source of this oil vapor was an outside vent on the lubricating oil system, which was some distance from the air intake. It was concluded that certain weather conditions would carry the vapor toward the compressor inlet. A 30 ft vertical extension was put on this particular vent, but on the February inspection there was still some sign of oil vapor entering the compressor, resulting in a deposit. The vent

has now been piped to the waste heat boiler stack and we feel that this will correct the difficulty."

In conclusion, Mr. Howard stated that he sincerely feels the gas turbine has already earned a leading position in competition for selection as the prime mover in any thermal plant contemplating units of 15,000 hp or less. "This arbitrary, temporary limit will certainly be revised upward as we become more familiar with the advantage attainable, and get more operating experience."

Additional Information

Engineers interested in obtaining additional operating and design data on this first central station gas turbine are referred to "Gas Turbine Power Plants for the Southwest", SP&I, December, 1948, and "Gas Turbine Performance Reported by Oklahoma Gas and Electric", SP&I, December, 1949. Mr. C. C. Willis and Mr. E. C. Goldsworth, of OG&E's engineering and operating departments are scheduled to present a discussion "Engineering and Construction Problems Involved in the Huey Gas Turbine Installation" at the A.S.M.E. Semi-Annual Meeting in St. Louis, Missouri, June 19-23, 1950.

Fire Safety During Plant Shutdowns

With plant shutdowns in the offing for vacation closing, fire protection must be considered. Here is what to do about housekeeping, waste disposal, and flammable liquids and gases.

WHENEVER a plant must shut down for vacation closings, long week-ends, strikes, or for any other reason, proper safeguards against fire take on added importance. There will be few employees present to discover and handle any fires. Consequently, everything possible should be done to eliminate sources of fire, and to keep fire protective equipment ready for immediate action.

The fire safety of the plant depends primarily on whatever men remain on duty—the plant protection force, watchmen, maintenance workers, supervisors, or executives—and they must be prepared to act effectively in case fire breaks out. Public fire department officials also should be notified in advance of the shutdown and a definite plan of procedure for fire or other emergencies should be arranged.

Preparing for Shutdown

The plant should be left thoroughly clean to eliminate sources of fire. Shut off electric and other power except where needed for

Fire Safety Check List for Plant Shutdowns

Housekeeping and Waste Disposal

- Dispose of combustible waste material from buildings and grounds, especially at machines, under tables or benches, under stairways, and in machine or elevator pits.
- Clean lint or combustible deposits from machines, floors, beams, walls, ceilings, and fixtures.
- Remove flammable residues from ovens, spray-booths, hoods, and ducts.
- Pay particular attention to cleanliness of storage areas. Make sure that sprinklers are unobstructed by high-piled stock and that liberal aisleways have been maintained.

Flammable Liquids

- Remove liquids from dip, cleaning, and mixing tanks. If this cannot be done, cover tanks tightly.
- Relocate any storage of liquids at processes or in exposed service tanks to buried tanks or to tightly covered containers in a sprinklered storage area.
- Shut discharge valves on butane or propane storage tanks.
- Shut off pumps supplying fuel oil under pressure to plant distribution piping.
- Make sure that gage glass valves are shut.

Flammable Gases

- Shut off individual burner valves and the main valve for each heating unit.
- If possible, shut off main valves outside buildings or at meters.
- Disconnect or shut off cylinders at manifolds.
- Reduce number of portable cylinders in main buildings to a minimum.

Electric Power

- Maintain lights in service.
- Maintain power for fire pumps, oil burners, and possibly elevators.
- Open switches on all circuits that will not be in use.
- De-energize transformers except those providing power for fire pumps, etc.

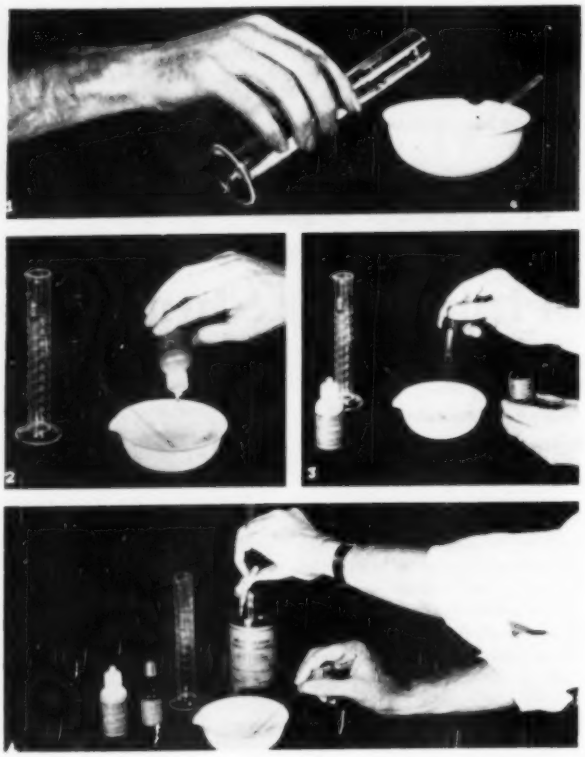
Watch and Guard Service

- Maintain standard recorded watch rounds 24 hours a day.
- Make sure that watchmen and patrolmen are familiar with use of protective equipment, and understand their regular and emergency duties.

Protective Equipment

- Inspect every sprinkler valve to be sure that it is open, sealed, and accessible, and record conditions in detail.
- Check dry pipe valves; sprinkler alarms; fire pumps; tanks and other water supplies; hydrants and hose equipment; hand extinguishers; fire-doors.

Note: Permission was granted by the Factory Mutual Engineering Division of the Associated Factory Mutual Fire Insurance Companies to adapt this material from their Bulletin No. 2.80.



STEP-BY-STEP PROCEDURE IS ILLUSTRATED: 1. MEASURED SAMPLE IS POURED INTO A PORCELAIN DISH. 2. A SMALL AMOUNT OF BUFFER SOLUTION IS STIRRED IN TO BRING THE SAMPLE TO A SUITABLE pH VALUE. 3. INDICATOR IS ADDED, AND WELL STIRRED, TURNING THE WATER RED. 4. TITRATION TURNS THE COLOR FROM RED TO BLUISH AT THE ENDPOINT. PROCEDURE FOR HARDNESS DUE TO CALCIUM ALONE IS IDENTICAL, BUT WITH A DIFFERENT BUFFER SOLUTION AND INDICATOR, AND WITH FINAL COLOR AFTER TITRATION A VIOLET BLUE.

Rapid Water Hardness Determination

Total water hardness, and the hardness caused by calcium alone can be accurately measured by easy methods in approximately one minute, according to Hall Laboratories, Inc.

Methods are based on discoveries of Dr. G. Schwarzenbach, with Hall modifications that make them convenient for general field use. **The Hagan Total Hardness Test,** expected to supplant the time-consuming "soap shaking" method, involves a simple, direct titration with a distinct color change at the endpoint, so that the possibility of error due to subjective judgment is eliminated.

No complicated heating, waiting, filtering or estimating is required. The answer, correct to less than 1 ppm of calcium, is found in one minute. Where it is desirable to determine hardness due specifically to magnesium in the water, operator makes the total hardness test and the calcium test, the difference giving him the magnesium value.

Procedure, equipment and reagents required for either the Hagan Total Hardness Test or the Hagan Calcium Test are available through the Hagan Corporation, Calgon, Inc., and The Buromin Company.

fire pumps, lighting, and other services essential to the idle plant. Prohibit or strictly regulate smoking.

Plan for competent watch and guard service. The safety of the plant depends on the watchman or plant patrolman most of the time.

Thorough inspection to make sure that fire fighting equipment is in readiness is essential to the plant's safety. The accompanying check list covers the most essential precautions to be taken.

All automatic protection and safety devices should be tested before the plant resumes operation. Before starting machines, check lubrication, cooling, and adjustments.

Gas equipment should be checked to make sure all burner valves are shut before opening main gas valves. Equipment should be ventilated thoroughly. Assign only experienced burner men to light-off equipment and follow established safe procedures.

On electrical equipment open motor control switch at each machine before closing feeder switches.

Alterations or Repairs

Vacation closings are frequently utilized for maintenance work and alterations which cannot be conveniently carried out while the plant is operating. Such work, unless properly safeguarded, can introduce serious fire hazards.

If **cutting or welding** is to be done, appoint a competent supervisor. Avoid welding in the vicinity of combustibles, unless the material can be protected adequately from sparks. Always keep sprinklers in service while cutting or welding.

If alterations require **shutting off the sprinkler system,** obtain permission in advance from the insurance company. Shut off as small an area as possible using "Sprinkler Valve Closed" tags. Keep a man stationed at the closed valve ready to open it at once if fire breaks out. Do not leave sprinklers shut off overnight.

If furnaces, ovens, and other equipment involving flammable liquids or gases are to be installed or re-arranged, guard against fire and explosion hazards.

Rx LUBRICATION

By C. J. Copley and Will Risk

Part XV—Conveyor Lubrication

Mechanical conveyors have more or less replaced antiquated methods of handling material in the field of industry. They have gone far toward reducing costs and increasing dependability of production.

A conveyor installation, from the standpoint of first cost, is usually expensive. The cost of keeping it in repair is an important consideration. The life of a conveyor, and its smooth operation, has a vital bearing upon its profitability. Therefore, in order to prolong its life, maintain low replacement costs and prevent unnecessary shutdown for repairs, this equipment should receive intelligent care and attention.

Correct lubrication plays a most important part in the successful operation of mechanical conveying machinery. Speeds are slow, and the materials handled are often dusty, gritty or corrosive. The combined effect of these conditions makes the problem of lubrication more than one of merely supplying an oil film between the bearing surfaces. While the prevention of excessive wear by lubrication is necessary and vital, the protection of wearing parts against rust, abrasion or corrosion is equally important.

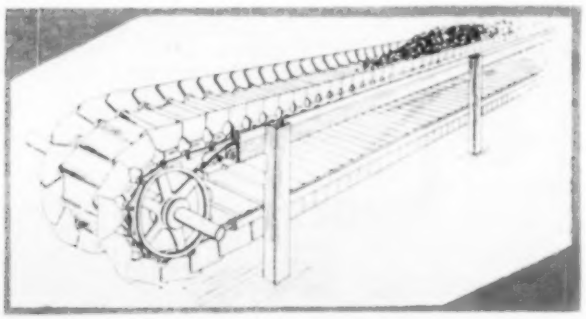
TYPES OF CONVEYORS

The selecting of the conveying mechanism to be used is usually determined by the kind of materials to be moved, how they are to be moved and where they are to be moved. To successfully accomplish these objectives the plant engineer has many forms of conveyor designs to choose from. In many cases suitable conveyors for the problem at hand may call for special design or, perhaps more frequently, suggest the adaptation and combination of existent stock forms of conveying mechanisms.

Perhaps the most common form of conveyors for transporting bulk materials considerable distances, are those utilizing the endless belt. Where materials are to be elevated, at a sharp angle, the bucket type of conveyor offers many possibilities. The flight type of conveyor is frequently used for the handling of lumpy, granular or soft materials. Cable conveyors, consisting essentially of a wire rope or cable with spaced discs that drag the material through troughs, are a very simple form of conveyor. Apron, platform, screw and roller conveyors are additional types commonly found employed in industry.

PARTS OF THE CONVEYOR

Basically, aside from the drive employed, the parts of the conveyor requiring lubrication are bearings and/or slides. The bearings may be either plain or anti-friction, grease or oil lubricated. Their method of lubrication may be by hand or by any one of a number of time saving methods.



THEORY OF LUBRICATION

The theory of bearing lubrication has already been covered in another section. The principles outlined, whether the bearings encountered are plain or anti-friction, hold for the bearings of a conveyor system.

LUBRICATION PROBLEMS

Two things contribute to the problem of proper lubrication of a conveyor, namely, the difficulty of applying the lubricant and the hazards imposed by conditions under which the conveyor operates.

Application of the Lubricant

Conveyors usually employ a great number of bearings requiring servicing with a grease or an oil at frequent or regular intervals. Many of these bearings are in locations difficult to be reached and, without meticulous attention, tend to be "missed". Since the failure of one bearing might lead to the shutting down of the whole conveying system (which in turn may disrupt the production of the plant) the proper, dependable application of the lubricant becomes **important.**

Hand oiling at best is intermittent. Bearings tend to be given a costly "over-supply" of lubricant and then are allowed to "starve" until the oiler again makes his rounds.

Very satisfactory results can be obtained when some simple device such as a "bottle" oiler is used for oil lubricated bearings or a mechanical forced feed system for the regular measured application of grease.

Such systems pay off in various ways:

First: The lubricant is fed automatically and thereby the uncertainty of the human element is eliminated.

Second: Mechanical lubricators are economical because they supply very small amounts of oil or grease at regular intervals rather than large doses at infrequent intervals.

Third: They are efficient because they assure a continuous supply of the lubricant during operation and exclude dust and grit from the bearings.

Fourth: They require but little attention since the reservoirs usually need but monthly replenishment.

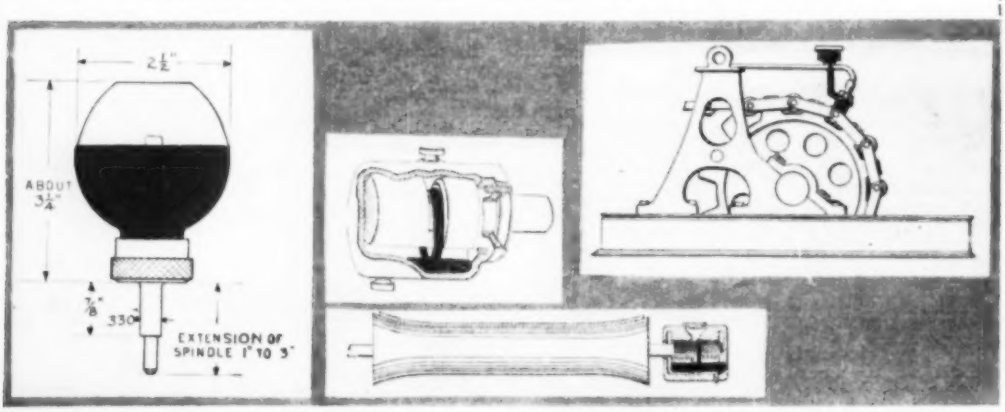
Operating Conditions

Operating "headaches" of conveyors can be considerably reduced if attention is paid to the conditions under which the conveyors are asked to operate. Since most conveyors are of slow speed operation and the loads they carry are usually well distributed, speed and load are not often the cause of break-down or the reason for stoppages.

More important are the four elements of **Temperature, moisture,** the presence of wear producing **abrasives,** and possible contact with **corrosive materials.**

For example, consider the coal handling conveyors of a central station power plant. Here the conveyor picks up the coal outside the plant, perhaps in zero weather, and carries it into the high temperatures of the boiler room. The oil or grease

THE BOTTLE OILER SHOWN AT LEFT SUPPLIES SMALL QUANTITIES OF OIL TO A JOURNAL. THE TOP CENTER VIEW SHOWS A DUSTPROOF RING-OILED BEARING, AND AT BOTTOM CENTER IS A RING-OILED ROLL USED ON BELT CONVEYORS. AT UPPER RIGHT IS A WICK-FED BRUSH WHICH SWABS THE LINKS OF A CONVEYOR AS THEY PASS.



is supposed to remain fluid while outside the plant, yet remain thick enough in the boiler room to do its job.

Perhaps a conveyor is taking kitchen ware material from the enamel bath to and through the baking ovens where the temperature may be over 500 F. Then again, the conveyor may take bread pans through an alkali cleaning bath or perhaps the conveyor travels through rooms where the air is filled with abrasive grit or dust.

These and many other conditions of operation should be carefully considered when the lubricant is selected and the method of its application is being considered.

LUBRICATION PRESCRIPTIONS

Temperature Variations

Where conveyors operate in temperatures that are fairly consistent (having a maximum variation of 40 to 50 degrees from high to low), the selection of the oil or grease to be used offers little or no problem. However, when surrounding temperatures vary in a marked degree, special attention should be given to the nature of the product to be used.

Where low temperatures are encountered (0 F or below) the grease or oil selected should retain sufficient viscosity or plasticity to flow or move freely at the maximum low temperature expected to be encountered. In an oil, both its viscosity and pour point should be determined in order to know how the oil will act in the bearings at those temperatures. In a grease, its pumpability at low temperatures should be determined for the same reason.

Where high temperatures play a part in conveyor operation, the same practice should be followed. The product selected should be measured in terms of the service it will offer under the particular operating temperature encountered. In some cases, such as in baking ovens where temperature may rise well over 500 F, the usual type of lubricant will burn and afford little or no protection. Here, operators sometimes mix graphite with a petroleum product and apply this mixture to the bearings. Under the high heat the petroleum product vaporizes, leaving the graphite to protect the bearing surfaces against wear. There is no general information for lubrication guidance, however, for such problems fall in the realm of special engineering consideration.

Quite often conveyors are called upon to operate where temperatures vary from a 0 F low to a 200 F high. Such conditions call for special consideration and it will be wise to query the lubricant supplier for a suitable lubricant.

Moisture

There are two ways of handling the problem where moisture is a factor that may affect efficient conveyor lubrication. First of all the degree of moisture should be defined. If such moisture is merely casual moisture, such as rain, damp weather or some form of wet processing, the problem is that of keeping the water out of the bearings. On the other hand, if the conveyor runs through a water or liquid bath, and there is little chance of keeping the water out, the problem is one of using a lubricant that will mix with the water or liquid and supply protection with continued application of the lubricant.

In the case of the casual moisture, care should be taken to see that the bearings are continuously fed with lubricant so that the water cannot replace the lubricant inside the bearing. Where a grease is used, it should be of a type that lubricates in the presence of moisture. Soda soap bases are not preferred in such instances.

Where water is inevitable, the oil or grease should readily mix with water. The resultant saponified mixture of oil and water (or grease and water) will afford fair protection as long as the oil or grease is continually supplied and is not washed completely out of the bearing.

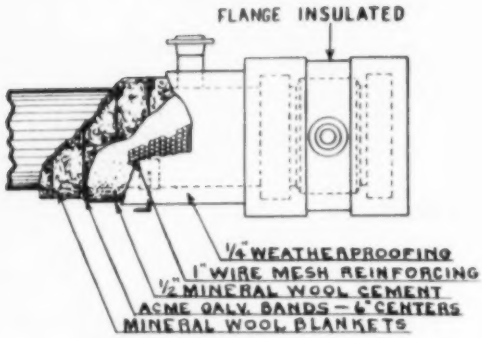
Efficient lubrication under conditions where the liquid in which the conveyor is submerged is other than water (such as the alkali cleaning bath of a metal washing machine) the problem becomes quite complex and advice should be sought from the lubricant supplier.

Abrasives

The most common problem of conveyor lubrication occurs under operating conditions where the air surrounding the conveyor is heavily loaded with dust, grit, or other abrasive material.

Here again, if such contamination is mild, the abrasive material can be kept out of the bearing by keeping the bearing full of oil or grease. Where mechanical conditions are so bad that these destructive materials cannot be kept out, use greater feeds of lubricant so that such abrasive materials inside the bearing are continually flushed out.

FIGURE 1



Although it is primarily used to increase plant efficiency, the heat exchanger is often inefficiently operated because it is not adequately insulated.

A CAREFUL INSULATION JOB, AS ILLUSTRATED BY THIS MINERAL WOOL INSULATED EXCHANGER, CAN DECREASE HEAT LOSS WELL OVER 90 PER CENT.

How to Insulate Heat Exchangers

BEFORE applying insulation the surface of the exchanger should be cleaned of dirt, grease and other extraneous material. Then the steps as illustrated above should be applied. Blankets of mineral wool are well suited for this application as they conform easily to the shape of the exchanger.

The insulation is applied directly over the surface of the exchanger and galvanized bands or strong wires on 6-in. centers are used to secure the blankets in place. A ½-in. layer of insulating cement is then troweled over the surface and joints of the blankets to provide a smooth uninterrupted exterior.

When the cement is thoroughly dry, one-inch-mesh galvanized wire netting is stretched tightly over the surface and secured permanently to provide adequate reinforcing for a coating of ¼-inch-thick asphaltic weatherproofing which is then applied over the wire netting. These last two steps are necessary only if the installation is out-of-doors.

TABLE 1

Gauge Pressure	Steam Temp. (Deg. F.)	Diff. Between Temp. of Steam and Surrounding Air (Deg. F.)	Loss Per Hour Per Sq. Ft. (B.T.U.'s)	Waste of Coal in Lbs. Per Sq. Ft. Per Year	No. of Sq. Ft. of Surface that Wastes 1 Ton of Coal Per Year
0	212	142	334	293	6.82
10	240	170	425	372	5.38
25	267	197	522.5	458	4.37
50	298	228	644	564	3.55
75	320	250	737.5	646	3.10
100	338	268	820	718	2.79
150	366	296	960	840	2.38
200	388	318	1,079	945	2.12
250	406	336	1,184	1,036	1.93

TEMPERATURE OF SURROUNDING AIR 70° F.

AS INDICATED IN THIS U. S. FUEL ADMINISTRATION TABLE, THE WASTED COAL PER SQUARE FOOT PER YEAR IS EXTREMELY HIGH WHEN HIGH TEMPERATURE EQUIPMENT IS UNINSULATED.

HYPOTHETICAL EXAMPLE

I. EQUIPMENT TO BE INSULATED

Heat exchanger 7'-0" diameter x 22'-0" long
Operating temperature 212 F
Yearly average room temperature 70 F

II. SUGGESTED INSULATION

1-in. thick mineral wool blanket
½-in. thick mineral wool insulating cement
¼-in. thick weatherproofing

III. HEAT LOSS ANALYSIS

Total area of heat exchanger 561 sq ft
Approx. heat loss from bare surfaces—334 Btu/sq ft/hr
Approx. heat loss when insulated as above 30 Btu/sq ft/hr
Savings calculated—304 Btu/sq ft/hr

IV. SAVINGS IN FUEL

304 Btu/sq ft/hr × 561 sq ft = 170,544 Btu/hr saved

$$\frac{170{,}544 \text{ Btu/hr} \times 24 \text{ hr day} \times 300 \text{ day year}}{13{,}000 \text{ Btu/lb coal} \times 2{,}000 \text{ lb/ton} \times 70\% \text{ operating efficiency}}$$

= 67 tons of coal saved per year

Courtesy Industrial Mineral Wool Institute

Feedwater Analysis and Treatment

A Study Course for Power Plant Chemists and Operators

This is the final article of a four part series of questions and answers. Part one appeared in February, part two in March, and part three in April. The information presented was originally prepared to help the men in the plants of Florida Power Corporation better understand the need for and effect of feedwater analysis and treatment procedures which have been adopted by that company.

By R. B. Lee
Production Engineer
Florida Power Corporation
St. Petersburg, Florida

. . . . PART FOUR . . . .

67—Describe the test that is made with the embrittlement detector developed by the U. S. Bureau of Mines (the type used in our plants).

The embrittlement detector is a piece of steel bar stock, properly shaped and subjected to a strain. Boiler water is allowed to leak by the bar. This meets the first two requirements for intercrystalline cracking. If the water has embrittling characteristics, the bar will fail. A test period of 30 days is usually required.

68—Why is acid cleaning of boiler internal surfaces the accepted method on our present boilers?

The boilers are composed of tubes bent in numerous shapes. The old method of turbining would be practically impossible due to lengths and bends of the tubes, and time required. Any size boiler can be thoroughly cleaned with acid and neutralized in 48 hours after it has cooled.

69—How is the action of acid on metal counteracted in boiler acid cleaning?

An inhibitor is used with the acid to counteract corrosion. There are numerous inhibitors, most of them trade secrets, but some nitrates are used. One school of thought believes that inhibitors provide a coating on steel that protects it from acid. After the cleaning is completed, the action is completely stopped by neutralizing with an alkaline solution.

70—Why is it necessary to flush the boiler or condenser thoroughly with water after acid cleaning? What check can be made on the wash water to see if there has been enough flushing?

A boiler or condenser should be thoroughly washed after acid cleaning. Any acid or neutralizing alkaline solution remaining would go into the system if not removed.

By knowing the alkalinity and pH of the clean wash water, a check can be made on the used wash water as it comes out of the boiler or condenser. When analysis shows that the alkalinity of the discharge wash water has not increased or decreased, while passing through the boiler, the washing has then removed the chemicals.

71—Why is it necessary to degasify a steam sample before making a conductivity test if an accurate result is desired?

There are usually some gases in steam. These affect conductivity (see tables on ammonia and CO_2 in Water Analysis Books - S. M. Sperry).

72—Why does scale inside boiler tubes decrease boiler efficiency?

Scale inside boiler tubes reduces heat transfer from gases to the water or steam. It therefore requires more heat for the same boiler output, consequently, more fuel.

73—If a boiler contains 100,000 lb of water and the output is 250,000 lb per hour, what would be the increase in chloride concentration in boiler water if feedwater contains 4 ppm chloride and there is no blow-down?

Since the water in boiler would be changed $2\frac{1}{2}$ times per hour, the increase in chloride concentration would be $2\frac{1}{2} \times 4 = 10$ ppm per hour without blow-down.

74—Why is a vent condenser used with a deaerator? What governs the amount of opening on the vent valve of the vent condenser?

A vent condenser is used on deaerator to condense the steam that is liberated with the gases and return the condensate to system.

The opening of vent valve is governed by the amount of gas to be eliminated. This applies mainly to oxygen and CO_2 (very little ammonia can be eliminated in the deaerator). If the sulphate concentration in boiler shows an appreciable increase, this is probably due to incomplete elimination of oxygen from deaerator. Normally a plume of steam extending 2 to 3 feet above the vent is sufficient.

75—Give the steps in the operation of cracking scale in a bent tube evaporator.

The steps for cracking scale in an evaporator are: (1) Shut off steam to coils; (2) Close vapor outlet valve; (3) Drain water from shell; (4) Fill shell with cold water; (5) Turn on steam to coils; (6) Shut off steam; (7) Drain water from shell and turn on internal wash nozzles if provided; (8) Repeat this procedure if considered necessary; (9) Fill with water and put in operation by standard procedure.

76—How can you prevent priming and foaming in steam boilers?

Priming and foaming in boilers can be prevented by: (1) Keeping water level in drum at normal; (2) Keeping all chemical and solids concentrations below predetermined maximum; (3) Keeping out oil.

77—Name three scale-forming properties of water.

Calcium, magnesium, and silica will form hard scales in a boiler.

78—What are the two major objections of scale in a boiler?

The two major objections to scale in a boiler are: (1) It decreases boiler efficiency by reducing heat transfer; (2) It subjects metal to high temperature causing failures.

79—What are the principal causes of carryover in the steam?

The principal causes of carryover in steam are: (1) High solids concentration; (2) Foaming due to oil; (3) High water; (4) Large sudden increase in boiler output.

80—In mixing sulphite preparatory to dosing a boiler, is there much likelihood of this becoming sulphate before the operation is completed?

A small amount of sulphite will be affected, but this is a relatively slow reaction, so there will be very little change.

81—What benefits are derived from the use of internal phosphate treatment?

Although all water in the system and makeup are soft according to tests, there is some hardness introduced by evaporator carryover and condenser leakage. This is eliminated in the boiler by the residual phosphate radical that is maintained. The normal phosphate radical is maintained high enough so that any unusual condenser leakage will be discovered before the phosphate is used up.

82—In a station employing a water softener, what could possibly cause the presence of hardness in the feedwater?

If a softener is operated beyond its exchange cycle, hardness will be present. This in turn will alter the evaporator vapor.

83—In a station having softeners and evaporators, is supplementary treatment of the feedwater necessary to maintain properly conditioned boiler salines? Why?

Supplementary treatment is required to eliminate all oxygen, hardness from evaporator carryover or condenser leakage, and maintain desired pH and sulphate-alkalinity ratio.

84—By what methods is the maximum total solids concentration established for various boilers?

Tests are made on boilers at various solids concentrations and outputs for carryover. The maximum allowable solids concentrations are then established to meet the boiler manufacturers' guarantees.

85—Give procedure for storing boiler dry for a long idle period. Give procedure for wet storage.

The boiler is thoroughly drained for dry storage, and then pans of unslaked lime are put in the drums, and the boiler is closed. This can also be done in the furnace if dampers are tight.

For wet storage, increase sulphite concentration to about 75 ppm, and fill to the top, eliminating all air. Close all vents. Check periodically and maintain sulphite residual as well as desired pH and phosphate.

86—What treatment should be given boiler water if boiler is to be out of service and cold for one week, but water is not to be drained?

Increase sulphite residual, keep vents closed, and check to assure maintaining correct sulphite.

87—If the shell of an evaporator is to be acid cleaned, explain procedure and give checks that should be made.

To clean evaporator with acid (muriatic): (1) Dump water and allow to cool. (2) It is necessary to have a fair sized opening at top of evaporator to vent gases. Remove cover on this opening. (3) Fill with clean water above tubes, add muriatic acid to give 5% solution. (4) Check this solution in laboratory to determine amount of sodium hydroxide required to neutralize it. (5) Allow enough steam through coils to heat water between 140 degrees and 150 degrees F. Maintain this temperature. (6) Keep periodic check on strength of acid solution to determine when action ceases. This is done by neutralizing a sample in laboratory with sodium hydroxide. (7) As acid becomes weakened, add more, but do not have a solution stronger than 5%. (8) After action of acid has almost stopped (strength not changed for 15 minutes) cut off steam and dump. (9) Fill with water and add enough caustic to give pH of 9.5 approximately. (10) Heat for 15 minutes with steam and drain. (11) Flush with clean water twice. (12) Inspect.

Machine Shop Modernization Reduces Maintenance Cost

By selecting new equipment wisely for their run-down machine shop, a Southern textile mill has realized a 50% annual return on investment.

By Lawrence Allen

AN engineering study of a cotton mill machine shop indicated that proper new equipment would mean considerable savings in labor costs and in keeping the mill running without too much delay or down-time for maintenance. With a direct investment of about $12,000 in new machine tools, the mill is now getting a return of about $6,000 per year in cash savings, not including the indirect returns resulting from faster and better mill maintenance work.

Old Equipment

The original mill machine shop had the following equipment:

1—20" engine lathe — condition, worn out
1—10" engine lathe—condition, fair
1—12" shaper—condition, fair
1—hand miller—condition, worn out
1—belt driven hack saw—condition, worn out
1—drill press—condition, good
1—Whitin hand gear cutter—condition, worn out
1—3 hp grinding stand—condition, good.

After a study of the type of maintenance work generally required in the mill and a study of the type and condition of the equipment in the shop, it was decided to purchase the following new equipment:

1—16" heavy duty lathe
1—metal band saw
1—gear hob
1—milling machine
1—keyseater
1—sensitive drill in floor stand
1—emery stand (6" for tools only)
1—power pipe threading machine

Use and Application

All of the old tools were retained except the hand miller, the hack saw, and the gear cutter. These were in such poor condition that no worthwhile use could be made of them.

The large lathe is now used for turning beams and for other work that it can handle while the new lathe is tied up. The small lathe is still used for many light jobs where hand feed does not cut speed or efficiency to any extent.

Of the tools added, it was decided that the lathe should be purchased new and should be of good quality for this tool was to be the backbone of the program to reduce the cost of mill maintenance. It was borne in mind in selecting the lathe that it would be required to turn out precision work rapidly, and since the mill is now being modernized throughout, more and more precision work is going to be needed.

The lathe purchased is equipped with both independent and universal chucks, taper attachments, and a cooling system. It has fully justified the hopes held for it in reducing machining time.

The saw and power threading machines were bought with 110 v, single phase motors, and are portable so that they may be carried to different parts of the plant as needed. This type of work is frequently done on week-ends when the plant is not running, and it has been found far easier to carry the saw to a piece of shafting than to carry the shafting to the saw. These two tools have cut the time involved in maintenance work considerably.

The other tools purchased have further increased the capacity and efficiency of the shop to such an extent that many jobs that were previously sent out to machine shops are now done inside. The shop is able to make its own gears, this type of work being impossible in many instances on the old, worn-out hand machine. The new key seater is doing a much more accurate and faster job than could ever have been done on the shaper used in the past. Drilling operations have been speeded, and the breakage of small drill bits has been greatly reduced.

Savings

It was found, after the installation of the new equipment, that the maintenance crew could be reduced from 10 men down to 8 men and still have no more work for any man. This cut shop operating cost $5,700 in direct labor. However, this accounts for only a part of the return on the investment. Repairs in the mill on week-ends and holidays has been speeded considerably, and it is conservatively estimated that this will amount to better than $1000 a year saved in overtime pay. Certainly not the least of the benefits is the ability of the maintenance crew, using the new equipment, to get the production machinery repaired and back into production rapidly.

The investment in machine tools amounted to about $12,000. It is providing the mill a direct return of about 50% of the investment annually. It has enabled the shop to produce more and better work with less labor. The morale of the shop force is far better, and the various departments in the mill are pleased with the better maintenance jobs they are getting.

Rectifier Arcback Indicator

Surge-crest links, in conjunction with surge-crest ammeter, will reconstruct the arcback.

By A. J. Humphrey

Concord, Tenn.

ONE major fault found with mercury arc rectifiers is their occasional failure to rectify during part of the cycle. This phenomenon is called arcback or backfire. It occurs more frequently at higher operating voltages and currents, but in many cases is purely random in nature. Occasionally one tank in a group of ignitrons or one anode in a multi-anode tank is the cause of the majority of outages. In this case it is desirable to localize the trouble so that corrective measures may be applied.

Since an arcback usually results in a heavy reverse current, and is of consequence only because it does so, some indicating device is needed to designate which anode has carried a heavy current in the reverse direction. Overloading of other anodes may cause them to arcback before the circuit is cleared up, so the indicator should designate which one originated the trouble.

One such device, having the advantage of simplicity and cheapness, is the surge-crest link. When used in conjunction with a surge-crest ammeter by an intelligent operator, it is possible to reconstruct the arcback through the magnetic history of the links.

Design

The surge-crest link consists of several pieces of laminated magnetic material inserted in a small plastic tube. It was originally designed for use on transmission tower steel to collect data on lightning currents. Following a heavy current, its retained magnetism can be read in a meter having part of its magnetic circuit ready for inserting links. Both the links and the surge-crest ammeter may be obtained from the same manufacturer. While links may be calibrated, it is usually sufficient to treat them as if they were all alike and merely use their readings in a relative sense.

Utilization

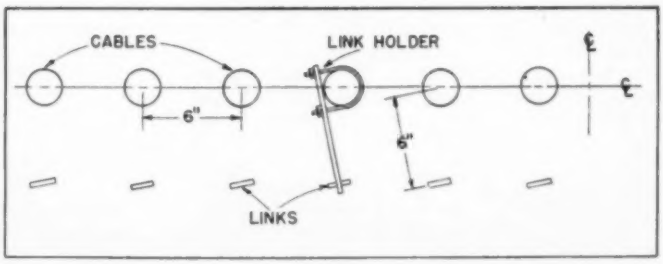
In one case with which I am familiar, the links were mounted in a row on each of twelve, million circular mil anode cables. The distance from each cable to its link was six inches. The sketch shows the cables on six inch centers. The link holders were made of wood and were fastened to the cables with brass U bolts. For this particular set-up, a distance of six inches from the center of the cable to the center of the link was found to give surge-crest ammeter readings up to almost full scale. In the case of a rectifier of smaller capacity, distances from link to cable should be shorter. Since arcback currents are in the nature of twenty to one hundred times normal operating currents, there will be no indication on the surge-crest links for normal operating currents.

After an arcback has occurred, the links are removed from their holders and identified with their location. They should have been inserted in the holders in such a way that the surge-crest ammeter will read downscale when the links indicate reverse current and upscale when forward current is indicated. The surge-crest ammeter reading from each of the links should be recorded, and if the arcback was of simple nature, one anode should show reverse current while several of the others show forward current. Owing to the close spacing of the cables, the anode showing reverse current may affect the surge crest links of the adjacent cables. The amount of this effect is dependent on the distance and the angle the link makes with the cable.

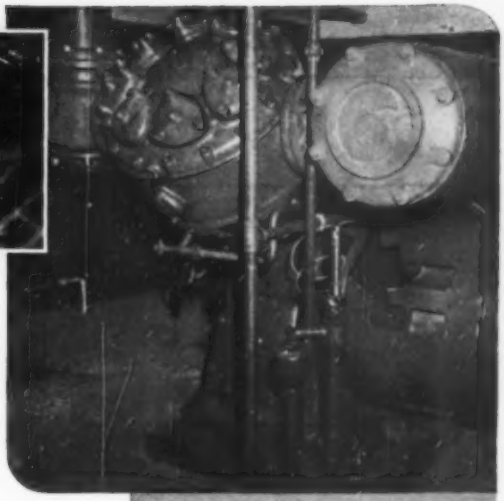
In a complex case where more than one anode arcs back, the link showing the heaviest reverse current can usually be shown to be from the anode which showed reverse current first. To make sure of this takes a slightly different technique in reading the links. A first reading is followed by partial demagnetization of each link with a small direct current field. The link which is easily demagnetized shows that it has been magnetized in the opposite direction. The link which is hard to reverse, has followed the hysteresis curve up from neutral. Through a careful analysis of this type of data, a good prophesy can be made as to the mechanism of the failure. After some experience has been obtained with this sort of thing, it is quite possible to decide which anode is causing the trouble from the first set of readings on the links.

To make the links ready for repeat service, they should be slowly withdrawn from an alternating field and then checked in the surge-crest ammeter for neutrality. If the links can be removed from the rectifier immediately after arcback, it will prevent subsequent arcbacks from erasing the first record from the links.

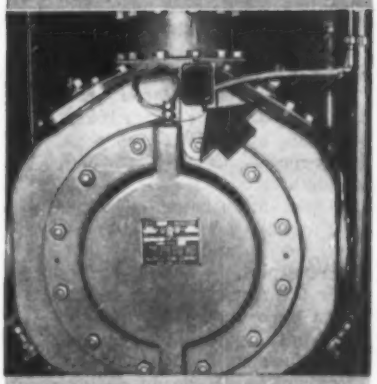
THE USE OF SURGE-CREST LINKS MAY BE APPLIED TO ALMOST ANY FAULT CURRENT PROBLEM PROVIDING CURRENTS ARE LARGE ENOUGH TO MAGNETIZE THE LINKS.



2/3 OF COOLING WATER *Saved!*



The Engineer at The Harvey Metals Corp. is well pleased with the Sarco TR-21 cooling control on this big compressor in Chicago. And so is the management because up to ⅔ of the metered water used for cooling is now saved. The engineer says: "With several thousand dollars tied up in a compressor, you are going to open up the cooling line wide and play safe, unless you have cooling control. Yes, we use the warm water too, but it used to overflow the hot well continually."



Bell rings and red light flashes when compressor cooling water gets too hot.

OTHER SARCO COOLING CONTROLS

When you merely want to protect the engine or compressor and don't care about the water there are several Sarco combinations available. You can put a high limit control on the compressor which will flash red lights and ring the gong when danger is near. Or you can just put on a Sarco Control that shuts down the compressor when the water gets too hot. For smaller compressors and vacuum pumps, the Sarco TR-40 Cooling Control is inexpensive, goes into the line like a T and is saving up to 50% of the water on many jobs.

ASK FOR BULLETIN No.700 ON SARCO COOLING CONTROLS

273

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DO WE WANT "FREE" ENTERPRISE?

No. 2 in a series of editorial messages

WE'VE been hearing a lot about our "free enterprise" system. But what's "free" about it? Is it, as we are sometimes led to believe in an election year, a system under which a governmental Santa Claus is supposed to provide us with a bountiful supply of free goods and services?

Not at all! Our "free enterprise" system means freedom of opportunity to engage in any business enterprise we may choose.

In the pioneering days in this country, each family built its own home, raised its own food, made its own clothes. But long, hard hours of toil were required to produce just the bare necessities of life. Gradually it was found that more goods and services could be made available if each person specialized on some one trade or occupation. So we developed into a nation of farmers and carpenters and plumbers and manufacturers and storekeepers.

In this development there has been opportunity for all, limited only by individual ability and industry. There has been freedom to engage in the occupation of one's choice. There has been incentive to work hard and efficiently, for the rewards have been in proportion to what each one produced.

To keep the "system" operating satisfactorily, the necessary checks and balances have been imposed automatically by the law of supply and demand. If, for instance, too many people began to make shoes, the supply soon became greater than the market would absorb and the less efficient operators had to find other occupations.

Under this system with its automatic checks and balances and its rewards for efficient performance, we have attained a standard of living which is the envy of the entire world. We have more than three-fourths of all the world's automobiles. We have 30,000,000 electric refrigerators and we have nearly 40,000,000 radios, or an average of about one for every home. And along with a constant increase in the per capita production of goods and services, we have steadily reduced our working hours. We have more time for recreation and play.

If this system has worked out so satisfactorily, why is it necessary to defend it? Actually, the principle of free enterprise needs no defense. There are relatively few people in this country—communists or socialists—who are openly opposed to our economic way of life. But what we must guard against are those who, under the guise of "economic planning," would gradually cripple and finally destroy our free enterprise system.

"Let us take care of you from the cradle to the grave," say some of the politicians and economic planners. "Let us provide low-cost housing, low rents, free medical services, ultra-modern schools, super highways. Let us give high prices to the farmers and low grocery bills to the consumers. Let us provide higher wages and shorter working hours by legislative decree instead of waiting on the natural economic processes. And along with all this, let's set up such large social security benefits that it will not be necessary for you to work hard and save for the proverbial 'rainy day'."

Unfortunately, the economic planners do not realize or purposely ignore these simple truths: We cannot legislate a higher standard of living; it can be attained only by increased production of goods and services. We cannot spread prosperity by printing and distributing more money.

In their glittering promises the economic planners set up the mirage of a welfare state in which government provides complete security for its citizens and makes prosperity automatically available to all. But what has resulted from such promises in Britain—or in Russia?

Our "free enterprise" system—with its opportunity and incentive and freedom for the individual—has brought to America the greatest prosperity and widest diffusion of wealth that any nation has ever known. That is a proven fact. In striking contrast is the dismal record of socialistic experiments in other lands.

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Readers are invited to send in kinks, ideas, and suggestions. Payment is made for all material accepted.

Handling Weights with Small Equipment

IN the small plant, which seldom has heavy machines or weights to handle, the foreman must usually conjure some method of handling the occasional too heavy machine with what he has.

One old well proven method is to "skid" the load (fasten heavy timbers under it) and then laying plank tracks, use some form of rollers between them. Often the only rolls are some old pipe, and the only motive power a few crow bars, and a crew that knows nothing about the job and cares even less. But if the supervisor knows his business including how to handle men, he can usually make a go of it, but some suggestions can be helpful.

If he can keep his load on fairly thick planks, so the rollers clear the ground well, one stunt when the usual means stall, is to put a pipe wrench on the rolls for power, which is far more effective than one would imagine. Rope blocks sometimes help, especially if one can hitch a second one onto the pull line of the first, but in that case the method is slow. Today, some form of power, like a truck or tractor is often available, and can be hooked on.

Another good means of handling loads on rolls, is to get them mounted on timbers heavy enough so the load won't sag them over much, then set a pair of track jacks at the back end of the timbers, and pick up timbers, rolls and load till the slant of the track is great enough so the load moves easily with the power at hand. cally and the exhaust air from Have a second set of timbers and rollers ahead, and as soon as the first set is loose, move it ahead in its turn and repeat. One old rigger used that system all his life; it requires only four timbers, two jacks and a few rollers, and you can go to town anywhere, for your load is always rolling down hill, with the grade as big or little as you please.

In handling small weights, say a ton or so, on rolls, use only two; when the back one pops out, the load should be nearly balanced across the remaining one, or can be pushed until it is. Then place the loose roll under the head and, teetering the balanced load as may be needed, and go again, repeating as necessary. It will be found surprisingly easy. As one old timer used to say, "Make one half of your load fight the other half, especially if you're shy on power."

Valve-Access Step

TO bring within reach the elevated handwheel on the suction valve of a centrifugal compressor the usual floor-encumbering and often unsightly stand was originally provided. This unit had to be moved when the floor was waxed, and occasionally was taken elsewhere and conveniently "forgotten" there—causing serious delay when the valve required wheeling.

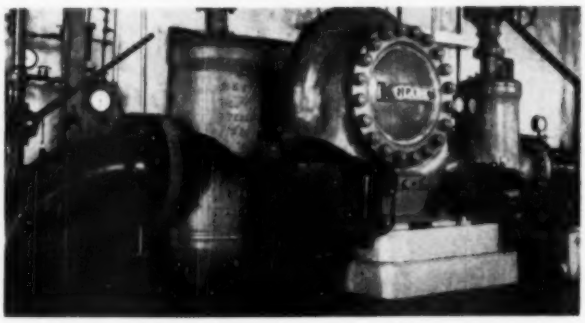
A section of floor plating was formed with the torch and bent at the sides so it would just fit inside the main flanges of the valve. Two holes, one in either side wing, were cut to fit flange bolts, and the inner edge of the step thus formed cut so that when the holes were placed over the bolts the edge would bear against the outer faces of the flanges.

By tightening down on the two flange bolts through the wings, the step was firmly fixed in position, capable of supporting much more than the weight of one operator.

The step, painted black, blends in well with the black piping; and, being supported entirely by the flanges, leaves the floor area under it entirely free for cleaning and for access to equipment located below.

ELTON STERRETT, *Houston, Texas*

NEW VALVE-ACCESS STEP, PAINTED BLACK, BLENDS IN WELL WITH BLACK PIPING. BEING SUPPORTED ENTIRELY BY FLANGES, THE STEP LEAVES THE FLOOR AREA UNDER IT ENTIRELY FREE FOR CLEANING.



"HOTTER, SOONER" Saves YOU MONEY

Yarway Impulse Steam Trap with new stainless steel body.

Yarway Impulse Steam Traps get equipment hot and into production *faster*. Extra profits!

Then they keep it *continuously* at peak operating temperatures for maximum production. More extra profits!

What's the reason for *hotter, sooner?* Just this. When steam is turned on, Yarways open wide, discharging the air and condensate *in a hurry* —closing only when steam arrives. Then, when operating temperature has been quickly reached, the little valve (only moving part) literally *floats on the load* . . . discharging heat-retarding condensate as soon as it forms instead of waiting for quantities to accumulate. Thus equipment is held at peak operating efficiency.

Other economical features of Yarway traps—minimum maintenance, easy installation, low initial cost.

More than 600,000 Yarways have already been installed. Sold by distributors throughout the world.

Try a Yarway today . . . standardize on Yarways tomorrow.

YARNALL-WARING COMPANY

Home Office: 116 Mermaid Ave., Philadelphia 18, Pa.
Southern Representative: ROGER A. MARTIN
Bona Allen Building, Atlanta 3, Ga.

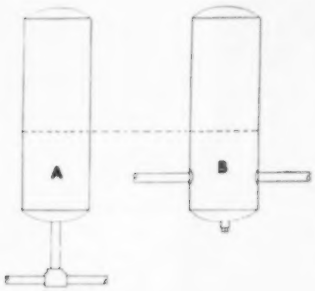
Nest of Yarway traps installed with Yarway Strainers on cloth dryer. Note small space required.

Stainless Steel Body

YARWAY IMPULSE STEAM TRAP

Suppressing Pump Pound

IN spite of an air chamber which, by rule-of-thumb standards, should have been big enough



to suppress or at least subdue the vibration or liquid pound in a hydraulic system, there was a force set up beyond the chamber. This force was severe enough to cause failure of the supply lines, and rapid wear of valves—especially checks—throughout the system.

The pound was cured by a simple change in the manner in which the chamber was "floated" on the pump discharge line. The original set-up is shown at "A", where the chamber was mounted above the line, with a riser from the tee tying into the bottom of the air holder through the usual cutoff valve and fittings. These fittings, as well as the air charging line, are omitted from the sketch for simplification.

By putting a drain plug into the former opening at the base of the chamber, and welding two flanges into the sides of the tank, the entire body of fluid within the chamber was subjected to the effect of the pulsation wave, and this in turn was opposed by air pressure over the entire cross-sectional area of the tank. The new set-up is shown at "B", with liquid level maintained as before. No further trouble with check valves was reported, and the annoying rattle of the pipes was entirely eliminated.

Centralization of Control

IN general, the grouping of control boards is desirable, especially for turbine or electrical boards. For boilers, however, there are several conditions which make partial decentralization of boards advantageous. These items are:

(a) Constant direct inspection and supervision of each boiler by the water tender and fireman are desirable. Centralization of control tends to make a congregating area for operators who should be giving attention to fire conditions and water level. It also makes operators too dependent on instruments. We are not yet at a point where there are satisfactory substitutes for water glasses and furnace inspection doors.

(b) Centralization makes for complication and expense, both in the original installation and in maintenance.

(c) Centralization, to justify itself, should reduce the operating and maintenance personnel and costs. In most cases the minimum operating personnel for boilers cannot be reduced appreciably by centralization of control.

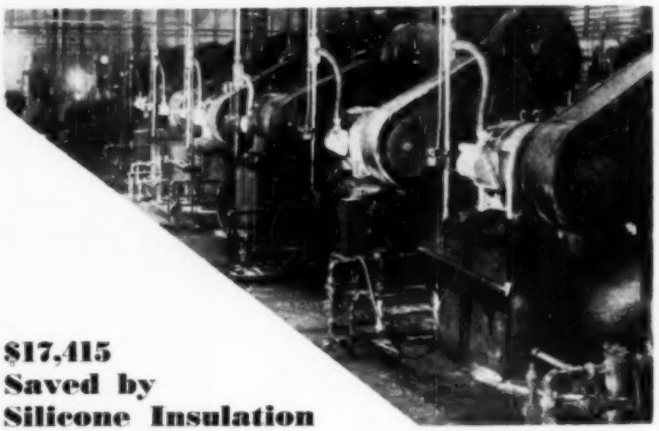
(d) Having an auxiliary water tenders board at the boiler feed control valves is an item which makes for safety and reliable emergency operation. Instruments to be in easy sight by water tender at boiler feed valves for emergency operation are:

Water glass level
Water level remote indicator
Boiler feed pressure
Boiler feed flow
Steam flow

Valves to be operated within sight of above are:

Automatic boiler feedwater regulator
Automatic boiler feedwater regulator by-pass
Hand operated boiler feed valve
One hand operated superheater outlet drain valve
One mud drum blowdown valve

JOSEPH H. DRAKE
Reynolds, Smith & Hills
Jacksonville, Fla.



$17,415 Saved by Silicone Insulation

ENGINEERS increased the pumping capacity in a production unit of The Dow Chemical Company by having 12 of their old 50 and 60 hp motors rewound with Dow Corning Silicone (Class H) Insulation. New 75 hp class A motors would have cost them $24,840 at list price; rewinding cost only $7,425. At a saving of $17,415, they got a line of class H motors that have much greater resistance to moisture, oil and corrosive atmospheres, plus greater overload protection than was true of the original motors.

A recording ammeter chart released by Dow's engineers shows that one of these 50 hp Silicone insulated motors was subjected to peak loads of 86.5 hp at frequent intervals during the past two years of service. Under such loads and temperatures, bearings might be expected to fail, but they prevented that by using DC 44 silicone grease.

this small, low-priced BJ HYDROPLEX PUMP is *engineered* for economical boiler feed service

THESE HYDROPLEX PUMPS provide 30 gpm of cold condensate at 435 psi. They are 10-stage units, driven by 25 hp motors at 3550 rpm.

- For medium pressure, medium temperature, low capacity pumping.
- Uniform, non-pulsating flow.
- Variable capacities without by-pass or speed change.
- Vertical construction—needs only a simple foundation and a minimum of floor space.
- No relief valves.
- Only one stuffingbox . . . and it is under suction pressure.
- Radial forces balanced at all loads by staggered volute construction.
- Axial thrust balanced by opposed grouping of impellers.
- Easily dismantled and reassembled.

IF YOUR PUMPING JOB involves a medium pressure, medium temperature, low capacity operation, the BJ Hydroplex can do it with quiet, smooth efficiency *and with less installation and maintenance cost*. This smaller, low-priced version of the highly successful BJ Hydropress centrifugal pump has a capacity range from 10 to 140 gpm at heads of 450 to 1700 feet. It operates at high speeds—3550 rpm on 60 cycle and 2950 on 50 cycle and higher in special units.

You'll find that this simple, dependable BJ Hydroplex has definite advantages over complex displacement type pumps. For full information, send the coupon now.

Byron Jackson Co.

Since 1872

P. O. Box 2017 Terminal Annex, Los Angeles 54, Calif.

OFFICES IN PRINCIPAL CITIES

BJ PUMP DIVISION, DEPT. 62

Our problem is pumping _____ gpm of _____
at a head of _____ Tell me more about the BJ Hydroplex.

NAME _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____

No obligation, of course.

NEWS
FOR SOUTHERN INDUSTRY

Southern Chain—Birmingham

Organization of THE SOUTHERN CHAIN & MFG. CO., 1224 Second Ave., BIRMINGHAM, ALABAMA, was announced recently by James W. Dickey, vice president and general manager of the Round Associate Chain Companies with which Southern Chain will be affiliated.

The Southern Chain & Mfg. Co. will operate as an independent concern and will be managed and operated entirely by Southern personnel It will, however, distribute the products of other Round associate companies which produce industrial, marine, railway, automotive, building, home and farm chain of every type, as well as chain noists and other material-handling eqoipment.

A. J. WILLINGHAM, JR., will serve as general manager of the new company. He was formerly affiliated with The U. S. Pipe & Foundry Co., and

A. J. Willingham, Jr.

Moore-Handley Hardware Co., and is a graduate of Alabama Polytechnic Institute and University of Denver.

Southern Chain & Mfg. Co. president is Raymond L. Round, who holds a similar position in all the Round associate companies. James W. Dickey, vice president and treasurer of the Round Associate Companies, will serve in a like capacity with Southern Chain.

Opening of the Birmingham plant warehouse and offices is the first step in the company's southern expansion program.

FUTURE EVENTS
Of Engineering Interest

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, Sec'y, 29 West 39th St., New York, N. Y.
June 12-16, Oil & Gas Power Division Conference, Lord Baltimore Hotel, Baltimore, Md.
June 19-23, Semi-Annual Meeting, Hotel Statler, St. Louis, Mo.
June 22-24, Applied Mechanics Division Conference, Purdue University, Lafayette, Ind.
Sept. 25-27, New Orleans Section 1950 Conference, New Orleans, La.

AMERICAN SOCIETY FOR TESTING MATERIALS, Robert J. Painter, Asst. Sec'y, 1916 Race St., Philadelphia 3, Pa.
June 26-30, Testing Materials Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

THE INSTRUMENT SOCIETY OF AMERICA, Sec'y, 921 Ridge Ave., Pittsburgh 12, Pa.
Sept. 18-22, Fifth National Instrument Conference and Exhibit, Memorial Auditorium, Buffalo, N. Y.

AMERICAN PETROLEUM INSTITUTE, Sec'y, 50 West 50th St., New York, N. Y.
Sept. 25-27, Petroleum Mechanical Engineering Conference, Hotel Roosevelt, New Orleans, La.

AMERICAN SOCIETY FOR METALS, Wm. H. Eisenman, 7301 Euclid Ave., Cleveland, Ohio.
Oct. 23-27, National Metal Congress and Exposition, International Amphitheatre, Chicago, Ill.

NATIONAL POWER SHOW, International Exposition Co., Grand Central Palace, New York 17, N. Y.
Nov. 27-Dec. 2, Grand Central Palace, New York, N. Y.

AMERICAN SOCIETY OF REFRIGERATING ENGINEERS, M. C. Turpin, Sec'y, 40 West 40th St., ew York 18, N. Y.
Dec. 3-6, Annual Convention, Hotel Commodore, New York, N. Y.

Dowell Cites Four District Managers

John G. Staudt, Executive Vice-President and General Manager of **Dowell Incorporated,** awarded safety plaques to managers of four Dowell districts at a Spring conference in Tulsa. The plaques were presented to winning districts in an annual safety contest which is part of Dowell's strident safety program.

In the above photograph, from left to right, are **Staudt, W. S. Day,** of Mt. Pleasant, Mich.; **Jack Sutherlin,** of Wichita Falls, Tex.; **Jim A. Cummin,** of Wichita, Kans., and **Charles L. Power, Jr.,** of New Orleans. Dowell is a Tulsa firm specializing in the chemical cleaning of industrial equipment and in the cathodic protection of buried and submerged metals.

◆

ASRE—Kansas City

THE AMERICAN SOCIETY OF REFRIGERATING ENGINEERS will hold its 37th Spring Meeting in Kansas City from June 4 to June 7, 1950. Hotel Muehlebach will be headquarters for the meeting. Following the custom of the Society the Spring Meeting will be devoted to the presentation of technical papers on refrigerating subjects and, in addition, two engineering conferences on specialized problems of the industry will be held.

Arthur J. Hess of Los Angeles will be in charge of the technical program. M. W. Pehl of Kansas City is chairman of the convention committee and will arrange the social program. The Kansas City Section of ASRE will act as host for the meeting.

These firms *appreciate quality*, because they are famous makers of dependable POWER Equipment and Materials.

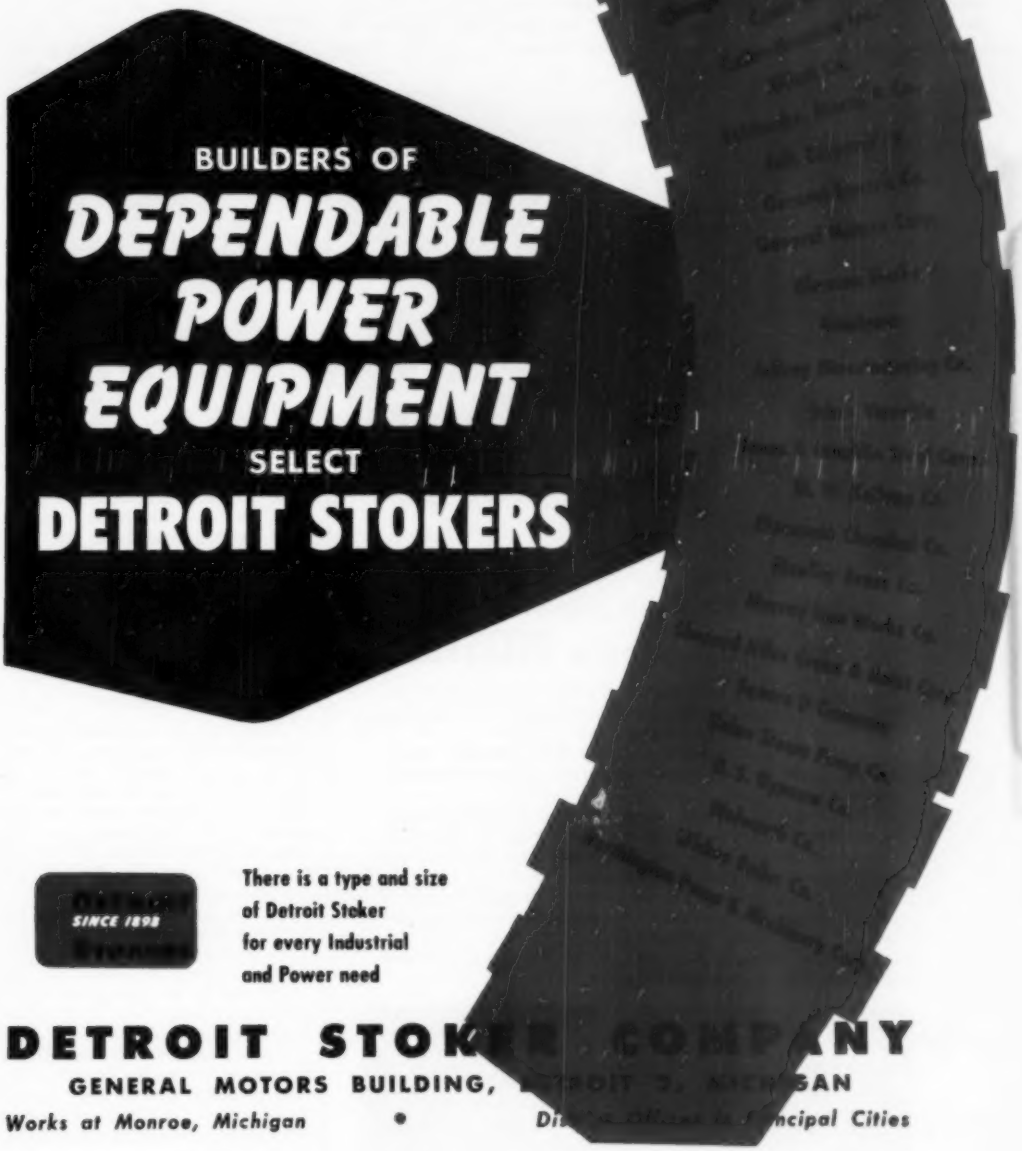
They chose Detroit Stokers because of their long record of satisfactory service with low maintenance, high economy and availability.

BUILDERS OF

DEPENDABLE POWER EQUIPMENT

SELECT

DETROIT STOKERS



SINCE 1898

There is a type and size of Detroit Stoker for every Industrial and Power need

DETROIT STOKER COMPANY

GENERAL MOTORS BUILDING, DETROIT 2, MICHIGAN

Works at Monroe, Michigan • *Direct Offices in Principal Cities*

Southeastern Representatives—Allis-Chalmers

Newly named sales representatives to offices in ALLIS-CHALMERS general machinery division's Southeast region are DEXTER E. FEARING, CHATTANOOGA; ROBERT C. HUMPHREY and WILLIAM W. CHALMERS, BIRMINGHAM, and FELIX B. LEETON, KNOXVILLE. All are mechanical engineers who recently completed the company's graduate training course.

Fearing, Humphrey and Chalmers are graduates of Alabama Polytechnic Institute. Leeton is an alumnus of the University of Tennessee. Chalmers will handle the sale and servicing of crushing, cement and mining machinery.

KENNETH K. MERCER, specialist in selling and servicing of water conditioning equipment and chemicals, has transferred to the Allis-Chalmers HOUSTON district office from where he will cover the Southwest region as a sales representative. A 1943 chemical engineering graduate of Ohio State University, Mercer joined Allis-Chalmers in 1949. He is a member of the American Institute of Chemical Engineers, the San Jacinto Chapter of Texas Professional Engineers, and the American Wood Preservers Association. He worked as a research and development engineer for the Standard Oil Development Co.; sales engineer for the Chapman Chemical Co. and the Leland Hammer Co. before joining Allis-Chalmers.

◆

Nalco—Atlanta

W. O. WIDENER, Southeastern District Engineer for the NATIONAL ALUMINATE CORPORATION, has announced the addition of ROBERT E. TOWELL as representative in the Southeast.

Mr. Towell, a graduate of Georgia Tech, has been with Nalco over two years, serving recently in the Wisconsin territory. He will headquarter at 627 Twin Oak Apartments in Decatur, Georgia.

◆

Crane Personnel Changes

CRANE CO., 836 S. Michigan Ave., Chicago 5, Ill., has announced that H. D. GIBSON, Branch Manager at NORFOLK, VA., has been promoted to Manager of the RICHMOND Branch, succeeding W. O. BROWN who has been advanced to Manager of the Plumbing Department, General Office, Chicago, Ill.

Mr. Gibson has served the Company in various capacities since 1930 when he started as a salesman in the Omaha Branch. In 1943 he was transferred to the Marine Sales Department, Chicago, and in 1944 appointed Manager at Norfolk.

Other promotions include: G. B. BATCHELOR, Manager, Norfolk, Va., from Manager at ROANOKE, VA., and P. J. SINEATH, JR., Manager at Roanoke from salesman at GREENSBORO, NORTH CAROLINA.

made to your specifications
from top-quality DIXISTEEL

Many Southern manufacturers and fabricators have found that they can improve their products and cut costs by using DIXISTEEL Forgings and Stampings.

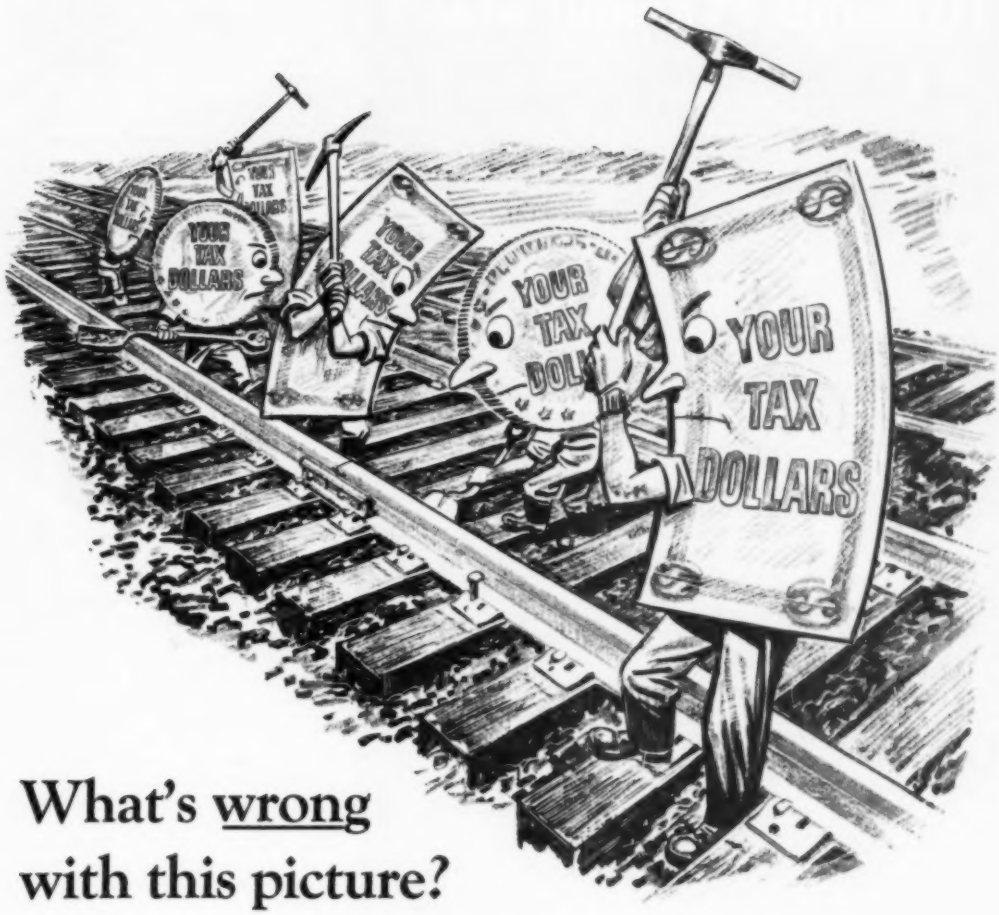
Made from our own open hearth DIXISTEEL, correct chemical and physical properties to meet your specifications are assured.

Blanked and formed parts are manufactured on the latest type presses, ranging in capacity up to 250 tons. Closed-die forgings up to 20 pounds are produced by skilled men on modern drop hammers.

Other facilities available to you include upsetting, trimming, threading, punching, hot-bending, broaching, descaling, and hot-dip galvanizing.

Without obligation to you, let us furnish details and estimates. Write or telephone today.

Atlantic Steel Company
MAKERS OF DIXISTEEL SINCE 1901
ATLANTA, GEORGIA



What's wrong with this picture?

What's wrong? Plenty! For you won't find a single one of your tax dollars "working" for the Southern Railway System.

That's because railroads are self-supporting. They stand on their own financial feet—not yours. They pay the costs of building and maintaining their "highways"... including bridges, tunnels and signals... out of their own pockets—*not with your tax dollars.*

Unfortunately for you... and for the tax-paying railroads... that isn't true of other forms of commercial inter-city transportation. Air, water and highway carriers use tremendously expensive transportation facilities paid for and maintained... not with their money ... *but with your tax dollars and ours!*

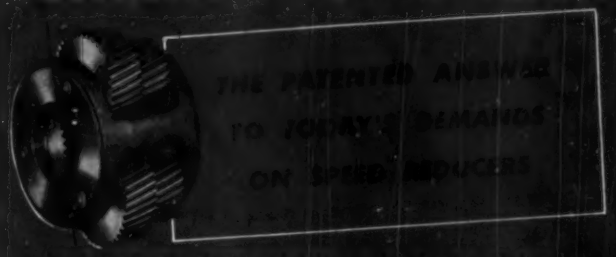
It will be a great day for all taxpayers... and better for *all* forms of transportation... when the "grown-up" highway, air and waterway carriers are weaned from the public purse and required to "pay their way"—as only railroads now do.

Ernest E. Norris
President

THE SOUTHERN SR SERVES THE SOUTH

SOUTHERN RAILWAY SYSTEM

FLOATING PYRAMID GEARS



Load distribution that is not only equal to begin with but remains self-equalizing during years of wear! That's the promise, and the practice, of Winsmith's Patented Differential Speed Reducers.

For, Winsmith's unique Floating Pyramid, a 6-gear planetary element, is free within the reducer housing to assume the most effective load distributing position. Thus it portions the load equally over a large total area of helical teeth, assuring quiet, vibrationless operation. In terms of dollars and cents value in your plant, or as a component of equipment you make, Floating Pyramid gears slash reducer maintenance and replacement costs.

REDUCTION RATIOS UNLIMITED

Whether your required reduction is 2:1 or 50,000:1 in transmitting fractional H. P. or 80 H. P., overall dimensions of the compact Winsmith Differential you select from stock, remain the same . . . the number of parts remains the same.

To make your power transmission a still stronger link in your production chain, Winsmith transmission engineers will review your present or projected power systems . . . will help gear your plant to today's demands for higher performance at lower cost, *without obligation.*

★ **FREE** Booklet 1949 containing complete application data and design illustrations. Write.

WHS
WINSMITH
SPEED REDUCERS

SEND OUT FOR CATALOG IN SWEET'S FILE

AGMA

WINFIELD H. SMITH CORPORATION

555 SPRING ST. SPRINGVILLE, ERIE COUNTY, N. Y.

Buffalo Pumps Forms Pulp & Paper Division

BUFFALO PUMPS, INC., and its parent organization, BUFFALO FORGE COMPANY, announce the formation of a Pulp and Paper Division to better serve the increasing needs of the Industry by integrating the engineering and application problems of liquid and air handling.

Manufacturing complete lines of stock, process and general service pumps, as well as fans and air conditioning equipment, this set-up will enable these companies to give better service.

JOHN B. CHANDLER, a Chemical Engineering graduate of Bowdoin College, formerly in charge of pulp and paper engineering for the Bristol Company, will manage this division.

Mr. Chandler's experience in the field includes six years with the Bristol Company, Waterbury, Connecticut, as well as a number of years of engineering and actual operation in pulp and paper mills. His work in process control will prove of value in his new position.

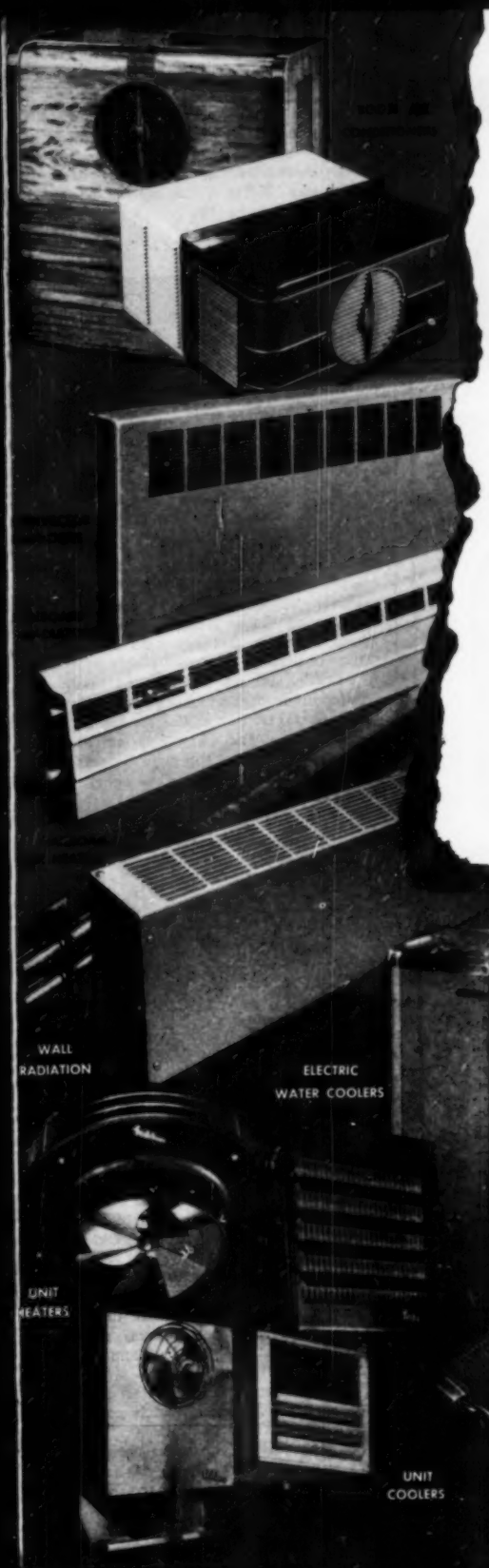
◆

National Supply—Shreveport

ROBERT A. SEALE has been appointed manager of the SHREVEPORT district for THE NATIONAL SUPPLY COMPANY.

Mr. Seale has been engaged in oil industry work in the Shreveport territory since 1934, and was branch manager for Hughes Tool Company at Shreveport for twelve years prior to joining National Supply.

Mr. Seale succeeds M. R. BRINKERHOFF, district manager at Shreveport for the past ten years, who was recently appointed assistant division credit manager for the territory comprising LOUISIANA, MISSISSIPPI, ALABAMA, east TEXAS and southern ARKANSAS.



YOU HAVE SOMETHING *Extra* TO SELL WHEN YOU SELL

fedders
A Great Name Since 1896

HEAT TRANSFER EXPERIENCE

HEATING DIVISION

Did you know that the Fedders Heating Division is rapidly becoming one of the largest manufacturers of heating products for home and industry?

AUTOMOTIVE DIVISION

Did you know that in addition to a constantly increasing line of heating equipment, Fedders has built millions of automobile radiators and car heater cores for standard equipment on America's fine automobiles and trucks?

REFRIGERATION DIVISION

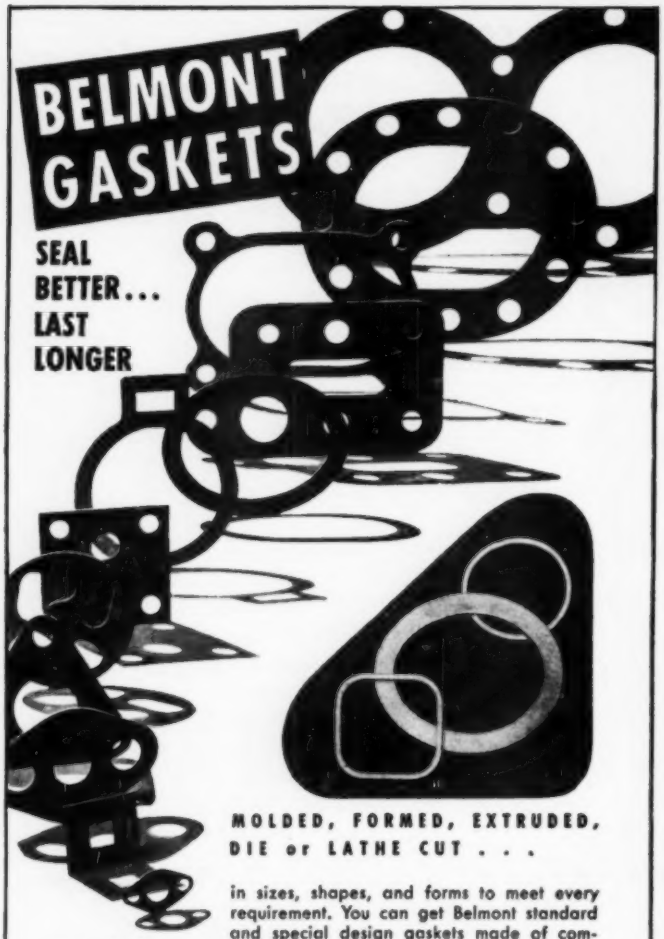
Did you know that Fedders is one of the largest manufacturers of air cooled finned condensers used as standard equipment on household, commercial and quick freeze refrigerators as well as air conditioning units?

AIR CONDITIONING DIVISION

Did you know that Fedders is one of the foremost manufacturers of room air conditioning units?

[redacted]

FEDDERS-QUIGAN CORPORATION
BUFFALO 2, N.Y.



MOLDED, FORMED, EXTRUDED, DIE or LATHE CUT . . .

in sizes, shapes, and forms to meet every requirement. You can get Belmont standard and special design gaskets made of compressed asbestos, woven asbestos metallic, red rubber, cloth inserts, black rubber, vegetable fibre, cork-vegetable fibre, gray rubber, neoprene, and a wide variety of compounded materials.

And, Belmont complete manufacturing facilities assure dimensional accuracy, uniform thickness and top quality finish.

Whether your gasket problem is . . . temperatures . . . pressure . . . vibration . . . shock . . . oxidation . . . corrosion . . . creep . . . reduction or just a matter of gasket size and shape, if you want BETTER JOINT AND SURFACE SEALING . . . longer gasket service lite — TRY BELMONT.

Distributors located in every large industrial center to serve you. Write for catalog #40.

. . . And, there's a Belmont Packing for Every Service.

THE BELMONT PACKING AND RUBBER CO.
Butler and Sepviva Streets
Philadelphia 37, Pa.

BELMONT
PHILADELPHIA U.S.A.

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FOR STEAM, WATER, OIL, GAS, AIR, ACIDS, ALKALIES, AMMONIA.

RINGS, SPIRALS, COILS, REELS, SPOOLS, SHEETS, GASKETS

Fairbanks Morse Promotions

ROBERT H. MORSE, JR., who started with the company in 1916 in the foundry of the Beloit, Wisc., plant, was elected to the Presidency of Fairbanks, Morse & Co. by the Directors, following the recent annual meeting of stockholders.

Mr. Morse has been Vice President in Charge of Operations. Previously he was Vice President in Charge of Sales, Assistant General Sales Manager and has held many other positions.

At the annual meeting of the shareholders of FAIRBANKS, MORSE & Co., MR. O. O. LEWIS was elected as a Director of the Company, and at the meeting of the Directors he was appointed a Vice President in Charge of Sales.

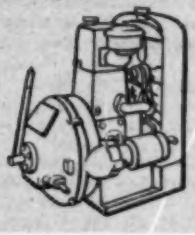
Mr. O. O. Lewis joined the Fairbanks, Morse organization in July, 1908, in a clerical position. For many years he operated as a sales field engineer in the States of Indiana, Ohio and Michigan.

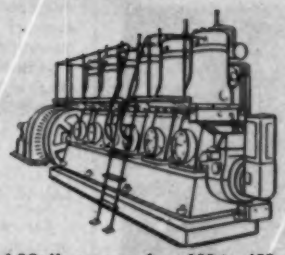
In 1932 he was appointed Manager of the Company's Atlanta Branch House, which position he filled until December, 1943, when he was appointed Assistant Sales Manager with headquarters in Chicago.

In September, 1948, he was appointed Sales Manager, which position he has held since then.

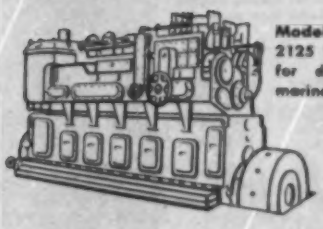
He is well known in the various

Model 45B: 5¼ horsepower engine for stationary and marine service.



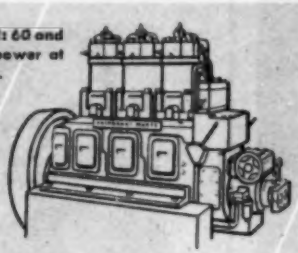


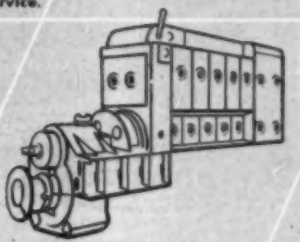
Model 32: Horsepower from 120 to 450. For slow-speed heavy- duty service.



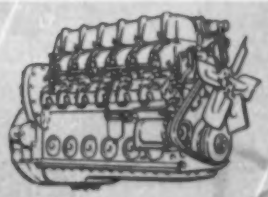
Model 37: 500 to 2125 horsepower for direct drive marine service.

Model 42: 60 and 90 horsepower at 450 r.p.m.

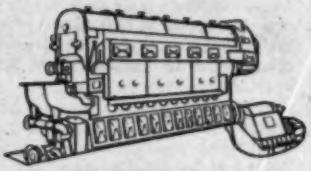




Model 31: Horsepower from 175 to 500; with 2 to 1 reduction gears optional for marine service.

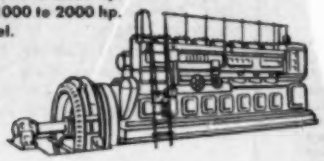


Model 49: Marine Engine: Also available for stationary or portable service. 20 to 150 hp.



Model 38 Opposed-Piston Engine: Horsepower from 960 to 1920 with 2 to 1 reduction gear for marine service.

Model 33 Stationary Engine: 500 to 2000 hp. Diesel, 1000 to 2000 hp. Dual Fuel.



When it comes to Diesel Power...

From 3.5 hp. to 3500 hp.

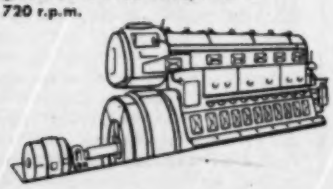
Low-cost, efficient power for all marine services . . . modern, dependable power for newest, fastest road locomotives . . . economical power for largest to smallest municipal and industrial plants . . . Fairbanks-Morse is the proved source for the full range of diesel applications. For skilled assistance and impartial recommendation for the diesel for your specific service, write Fairbanks, Morse & Co., Chicago 5, Ill.

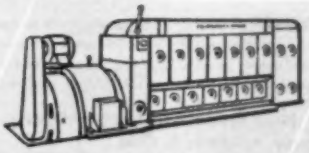
FAIRBANKS-MORSE,

a name worth remembering

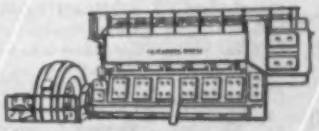
DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY • PUMPS • SCALES
HOME WATER SERVICE AND HEATING EQUIPMENT • RAIL CARS • FARM MACHINERY

Model 38 Opposed-Piston Engine: 960 to 1920 horsepower at 720 r.p.m.





Model 31: Diesel generating set with kw. ratings from 118 to 360. Marine and stationary—Dual Fuel available in larger sizes.



Model 31: 2100 to 3500 horsepower diesel or dual fuel engine for heavy-duty stationary service.

GLOBE ROTO-CUT meat cutters are the standard of the Packing Industry. They produce better meat products at higher speed.

The Ball Bearing and The Spherical Roller Bearing on the cutter shaft of the GLOBE ROTO-CUT machine.
The Globe Company says:
"It's the Lubricant"
LUBRIPLATE
SUPER-LUBRICATION
FISKE BROTHERS REFINING CO.

THIS LUBRICANT INCREASED BEARING LIFE FROM 2 WEEKS TO 2 YEARS

"After we had quite a few of our large high speed ROTO-CUT meat cutting machines in actual production operation, the ball and spherical roller bearings on the cutter shaft gave us serious trouble. Some bearings did not last even two weeks.

"In an effort to correct the difficulty, we contacted a number of the large lubricant manufacturers. We tried all the lubricants their engineers recommended without the slightest success. We checked with the manufacturers of the bearings who assured us that the bearings were not overloaded. The trouble was the condition that prevails throughout the meat packing industry, animal acids and moisture, a combination most harmful to ball and roller bearings.

"Then, Ball Bearing LUBRIPLATE was called to our attention. The results we obtained from its use were most gratifying and amazing. We have had these ROTO-CUT machines lubricated with Ball Bearing LUBRIPLATE in continuous operation, twenty-four hours a day, three hundred days a year for over *two years without a single bearing replacement.* We now use LUBRIPLATE for factory lubrication and recommend it to our customers for use on practically all the equipment we manufacture."

THE GLOBE COMPANY
Frank J. Bilek (Chief Engineer)

YES, LUBRIPLATE LUBRICANTS ARE DIFFERENT! They reduce friction, wear and power consumption . . . prevent rust and corrosion and last longer than ordinary lubricants. LUBRIPLATE Lubricants are available from the lightest fluids to the heaviest density greases. There is a LUBRIPLATE product best for your every lubrication need. Write for case histories of the use of LUBRIPLATE in your industry.

LUBRIPLATE DIVISION • Fiske Brothers Refining Company
Newark 5, New Jersey • Toledo 5, Ohio

DEALERS EVERYWHERE • SEE YOUR CLASSIFIED TELEPHONE BOOK

LUBRIPLATE the Modern Lubricant

engineering societies, having been a member for some time of American Society of Mechanical Engineers, The Society of Naval Architects and Marine Engineers, and The American Society of Naval Engineers, Inc.

◆

Marley Co.—Houston

JAMES W. ELIZARDI has recently been made manager of the HOUSTON sales office of THE MARLEY COMPANY, INC., Kansas City, Kansas. Elizardi,

who is a graduate of Tulane University, previously worked for Griscom-Russell and the Illinois Central Railroad.

◆

Electrical Service Company Appoints Northern Representatives

Russel H. Cudney, General Manager of the ELECTRICAL SERVICE COMPANY, Box 191, Greenville, Texas, has announced the appointment of two new sales representatives.

M. EDWARD MAXWELL, Box 299, Ridgewood, New Jersey, will cover New York, New Jersey, and sections of Pennsylvania.

ALLAN D. MCKERROW COMPANY, Box 351, Worcester, Mass., will cover Connecticut, Rhode Island, Massachusetts, Vermont, New Hampshire, and Maine.

◆

C. J. Gaskell Co. Expands

C. J. GASKELL CO., INC., MEMPHIS, TENN., has announced the addition of BALIE M. ROSS to its staff. Mr. Ross lives in NASHVILLE and will divide his time between the Nashville and Memphis areas. N. R. MEFFORD, formerly Chief Operating Engineer at Vanderbilt University, has also joined the Gaskell organization, and will handle all maintenance and service as well as selling throughout the company's territory.

Allis-Chalmers—Southwest

Newly named sales representatives to ALLIS-CHALMERS general machinery division's SOUTHWEST region are DAVID S. CLARK and HENRY E. SIMPSON.

Clark, an electrical engineering graduate of the University of Tennessee, has been assigned to the FORT WORTH, TEXAS, district office.

Simpson has been assigned to the BEAUMONT, TEXAS, district office. He was graduated as a mechanical engineer from Clemson A. & M. College. Both Clark and Simpson joined Allis-Chalmers in 1948 and have completed the company's graduate training course.

◆

Richard Goff Appointed Onan Representative

D. W. Onan & Sons, Inc., Minneapolis, Minnesota, manufacturers of electric generating plants, have announced the appointment of MR. RICHARD GOFF, of ATLANTA, GEORGIA, as Direct Factory Sales Representative covering the states of ALABAMA, ARKANSAS, FLORIDA, GEORGIA, MISSISSIPPI, SOUTH CAROLINA and TENNESSEE.

Mr. Goff has many years' experience in the industrial field. For the last three years he has specialized in electric generating plants and is thoroughly familiar with the generating equipment industry. His technical background includes two years at M. I. T. in the mechanical engineering school.

Mr. Goff will make his headquarters in Atlanta but will spend the majority of his time working directly with Onan distributors and dealers in the field

◆

Frederick Post Co. Appoints Coatney

THE FREDERICK POST COMPANY, BOX 803, Chicago 90, Ill., has announced the appointment of THOMAS L. COATNEY as general sales manager in charge of all sales operations.

Mr. Coatney was formerly general manager of the company's Southwestern Division with headquarters in HOUSTON, TEXAS. Before joining the Post Company in 1939, he managed The Rush Company in DALLAS, TEXAS, and prior to that time had been associated with the M. H. West Company in Dallas.

Succeeding Mr. Coatney as manager of the Post Company's Southwestern Division is ARTHUR C. MORALES, former assistant manager.

it pays to
FAN-PLAN
WITH EMERSON-ELECTRIC OSCILLATORS
EMERSON-ELECTRIC
5-YEAR
FACTORY-TO-USER
GUARANTEE
at No
Extra Charge
Stationary hollow-steel shaft is case-hardened and rigidly anchored in the motor frame.
Forced-feed lubrication — oil is continuously fed to bearing surfaces by spiral grooves and conveyor return.
Fingertip oscillation control—lets you simply "dial" any sweep, from 90 degrees to stationary.
The life of a fan depends largely on the life of its bearings. In Emerson-Electric 12- and 16-inch AC Oscillators, the rotor revolves on a stationary, case-hardened steel shaft . . . forming an oil-tight, smooth-running, and virtually wear-proof bearing. This exclusive feature, and others, account for the exceptional quietness and the longer service—with less servicing—these popular fans give. For lasting low-cost comfort, it pays to fan-plan with America's standard fan value. See your electrical contractor, or write for free Catalog No. 549A.
THE EMERSON ELECTRIC MFG. CO.
St. Louis 21, Mo.
Everything in Fans!
Besides the most complete line of Oscillating Desk and Stand Fans, Emerson-Electric offers Direct- and Belt-Drive Exhaust Fans, Air Circulators, Ceiling Fans, Window Fans, and Low Table Fans. Write for Catalog No. 549B.
EMERSON ELECTRIC
MOTORS • FANS
APPLIANCES

Continental Gin Opens New York Office

CONTINENTAL GIN COMPANY, Birmingham 2, Alabama, has recently opened a New York office to handle domestic and export activities of its Industrial Division in the East. The new office is located at Room 2407, 220 East 42nd St., New York 17, N. Y. Mr. Walter Gotta is district manager.

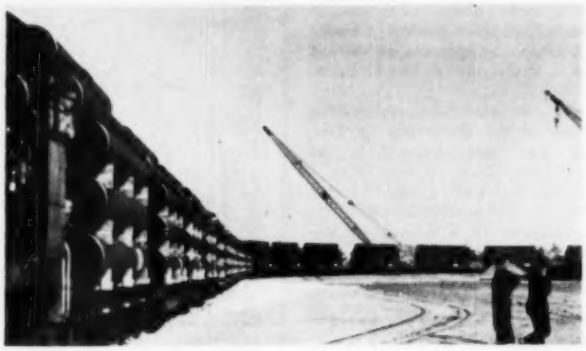
The Industrial Division specializes in the manufacture of materials handling and mechanical power transmission machinery as well as a variety of special work.

Other sales offices of the company are at ATLANTA, DALLAS, MEMPHIS, and the home office in BIRMINGHAM.

◆

Reynolds Metals—Atlanta

REYNOLDS METALS COMPANY, 2500 S. 3rd St., Louisville, Ky., has announced the appointment of T. D. LEWIS as division manager of the ATLANTA area for the company's General Sales Division. Mr. Lewis formerly served as sales representative in the San Francisco area.



First Pipe Leaves U. S. Steel's New Texas Mill

First trainload of large diameter pipe line pipe was shipped in April from the new pipe mill of U. S. Steel's Consolidated Western Steel Corporation at Orange, Texas.

The first load, consigned to the Tennessee Gas Transmission Company and destined for a gas transmission line under construction from Texas to the East Coast, consisted of 35 cars, each car with 17 pieces of 30-in. pipe 31 ft long. The new mill will produce 50 miles of large diameter pipe a month when full production is reached, serving principally long distance oil and gas pipe lines.

COOLING TOWERS
GAS EQUIPMENT
AIR COOLED HEAT EXCHANGERS
Producers of QUALITY Specialized Process EQUIPMENT
Pritchard's
NEW
Quintair*
AIR COOLED
HEAT EXCHANGER
For Dependable, Efficient Cooling or Condensing of Liquids, Gases or Vapors
● Lower Installed Cost ● Higher Efficiency
● Fewer Parts to Assemble
● Lower Maintenance Costs
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J.F. Pritchard & Co.
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908 Grand Ave., Kansas City 6, Mo.
District Offices:
CHICAGO • HOUSTON • NEW YORK • PITTSBURGH • TULSA • ST. LOUIS
Representatives in Principal Cities from Coast to Coast

Whiting Acquires Coburn-Foster Conveyors

The Whiting Corporation, Harvey, Illinois, manufacturers of materials-handling equipment, announces that it has taken over the belt and chain conveyor business formerly operated as the Coburn-Foster Conveyor Company, Chicago.

The chain and belt-conveyor product group will be headed by Mr. Gordon Foster, former president of Coburn-Foster, who will work under A. E. Bottenfield, Vice President in Charge of Whiting Merchandise Sales. Mr. Foster has had over 20 years' experience in the materials-handling field.

The conveyor equipment will be manufactured at the Whiting plants at Harvey, Illinois, and Los Angeles, California.

◆

South Florida Test Service Expands

THE SOUTH FLORIDA TEST SERVICE of MIAMI, FLORIDA, has announced the acquisition of an additional city block for the expansion of their inland proving grounds and plans for the erection of a new $25,000 laboratory building.

The company specializes in weathering, corrosion and sunlight tests utilizing the unique climatological conditions found in that section.

Johns-Manville—Atlanta and Houston

Appointment of T. J. ROBERTS of ATLANTA, GA., as HOUSTON District Manager of the JOHNS-MANVILLE INDUSTRIAL PRODUCTS DIVISION, was announced recently.

At the same time, the company promoted HENRY G. PALMER, to the post of Atlanta District Manager of the Industrial Products Division, succeeding Mr. Roberts. Mr. Palmer was formerly Assistant Manager of the Atlanta District.

A graduate of Cornell University, with a degree in Civil Engineering, Mr. Roberts began his career with Johns-Manville in 1925, and has since held many responsible sales posts with the company. In his new position, Mr. Roberts will supervise sales in TEXAS and parts of LOUISIANA, ARKANSAS and OKLAHOMA. He will make his headquarters in Houston, Texas.

Mr. Palmer is a graduate of the University of Georgia and later attended Georgia Tech where he was awarded an advanced degree in Civil Engineering.

He joined Johns-Manville in 1936 as a sales engineer in the Atlanta district after six years as resident engineer with the state highway department in Georgia. In his new post, Mr. Palmer will supervise sales in GEORGIA, FLORIDA, ALABAMA, SOUTH CAROLINA and parts of KENTUCKY, MISSISSIPPI, NORTH CAROLINA, TENNESSEE and VIRGINIA. His headquarters will be in Atlanta.

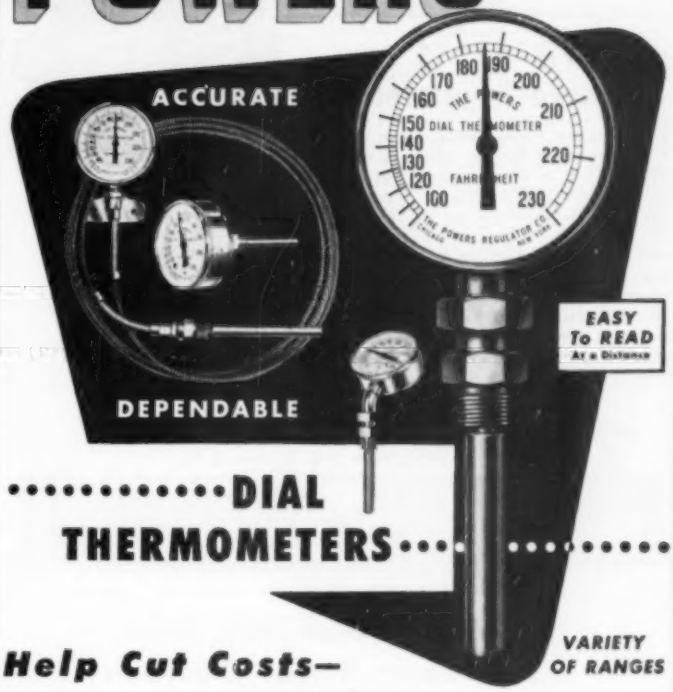
◆

New Full Wave Reversing Educational Thy-Mo-Trol Drive Announced

A new full wave reversing educational "Thy-mo-trol" drive, designed to assist in the teaching of electronic motor control and associated circuits, has been announced by the Educational Section of GENERAL ELECTRIC'S APPARATUS DEPARTMENT.

The demonstration equipment consists of 7 circuit panels and 5 instrument panels assembled on a steel frame, mounted vertically on a steel table with composition top. It embodies operating principles and essential components identical with those of the standard commercial General Electric full wave reversing Thy-mo-trol drives. A student working with the educational unit, will become well grounded in standard commercial practice, but will have an unusual opportunity of working with a unit designed to assist him in a step by step understanding of electronic motor controls and associated circuits," he concluded.

POWERS



Help Cut Costs—

For more accurate temperature readings and improved efficiency use POWERS Dial Thermometers. They're vapor pressure actuated. Have 4" dials with either rigid stem for use in pipe lines and tanks or flexible tubing type for conveniently showing the temperature at a remote point. For further information and prices phone or write our nearest office. Offices in 50 cities. Over 55 years of automatic temperature control. (DT2)

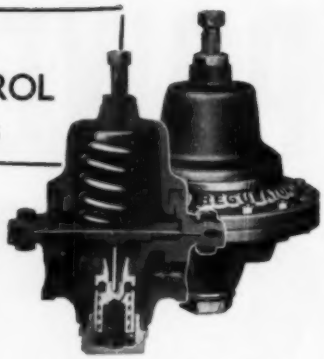
WRITE FOR BULLETIN 355

THE POWERS REGULATOR CO.
142 Spring St., N.W., Atlanta 3, Georgia
Gentlemen: Please send me Bulletin 355.

Name_____ Title_____
Firm Name_____
Address_____

Trouble-Free
PRESSURE CONTROL
for Small Units

DAVIS No. 13
Pressure Regulator

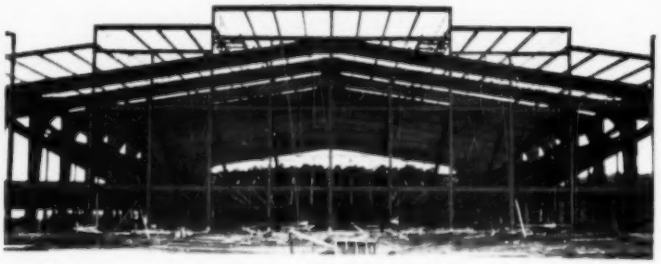


THIS pressure regulating valve is recommended for use where a restricted flow of steam, air or gas is required at reduced pressure. Single-seat valve is tight-closing, non-sticking — maintains pressure reduction automatically, regardless of circulation. All internal parts can be removed and inspected without disturbing connected piping. For full details on No. 13 and other Davis pressure regulators, write for a copy of Davis Bulletin No. 100-A.

- For Steam, Air, or Gas.
- Compact; self-contained. Built-in strainer.
- Economical to use.
- Initial pressures to 250 p.s.i.
- Reduced pressures, 1 to 100 p.s.i.
- Standard sizes ⅜" to 2".

DAVIS REGULATOR COMPANY
2507 So. Washtenaw Ave., Chicago 8, Ill.

How to Get the Most for your Steel Dollars



Specify Ingalls fabricated steel for that new stadium, office building, plant, warehouse—and you know the steel is fabricated **right** for maximum safety, permanence, utility and strength. For nearly half a century, Ingalls has served the nation with expert fabrication, erection and engineering service of structural steel, meeting the standards and schedules of industry's greatest names.

Whatever you may need in fabricated steelwork, contact Ingalls for fast, complete service. Five plants, complete engineering staff. Write for quotations.

Ingalls fabricated the steelwork for this new Coliseum, seating 14,000 persons, at the North Carolina State College, Raleigh.

STAINLESS STEEL · STRUCTURAL STEEL
OIL & CHEMICAL STORAGE TANKS
SHIPS & SHIP CONVERSIONS · BARGES
WORKBOATS · REPAIRS

INGALLS
STEEL
THE INGALLS IRON WORKS CO.
MAIN OFFICE: BIRMINGHAM, ALABAMA
Sales offices in New York, Chicago, Pittsburgh, New Orleans

Flexitallic Appointments

FLEXITALLIC GASKET COMPANY, Camden 2, N. J., has announced the following appointments:

THE MOORLANE COMPANY, TULSA, OKLA., with branches in Kansas City, Amarillo, Denver, Oklahoma City, and Wichita, is a new Flexitallic distributor.

THE BOILER EQUIPMENT SERVICE CO., 686 Greenwood Ave., N. E., ATLANTA, GA., has been appointed agent to serve ALABAMA, FLORIDA, GEORGIA, NORTH CAROLINA, SOUTH CAROLINA, and TENNESSEE.

LANE MACHINERY COMPANY, INC., Buder Bldg., 7th and Market Sts., ST. LOUIS 1, MO., has been appointed agent to serve eastern MISSOURI, southern ILLINOIS, western KENTUCKY, western TENNESSEE, and northeastern ARKANSAS.

◆

General Electric—St. Louis

G. F. MAUGHMER has been named manager of GENERAL ELECTRIC's new Apparatus Department sales district in the Midwest. The new district, twelfth territory in the company's nationwide sales system, will have its headquarters at ST. LOUIS. Mr. Maughmer was formerly manager of the G-E sales office at Los Angeles.

◆

Southwest Research Institute—Houston and San Antonio

SOUTHWEST RESEARCH INSTITUTE of HOUSTON and SAN ANTONIO has announced the appointment of twelve new members of the technical staff, which is composed of scientific workers, engineers, and technologists in scientific and engineering fields. They include JOHN R. BARTON, ATLANTA, GA.; DONALD W. CARTNER, KANSAS CITY, MO.; V. M. GUIDO, RICHARD HATFIELD, R. P. LANGLINAIS, and JOHN M. TAYLOR, JR., of SAN ANTONIO; CARLTON HERBEL of KINGSVILLE, TEXAS; and HERMAN LEVIN of BATON ROUGE, LA.

◆

-Plomb Appoints Ricke

THE PLOMB TOOL COMPANY, Los Angeles, Calif., has appointed WILLIAM H. RICKE as assistant sales manager in charge of GEORGIA, ALABAMA, and FLORIDA, with headquarters in Atlanta. Mr. Ricke was formerly field representative for the company in the South TEXAS territory, and has had previous experience as a consulting mechanical engineer and as a tool and die designer.

Joint Materials Handling Meeting Held in Winston-Salem

The American Society of Mechanical Engineers and the Society for the Advancement of Management jointly held a day-long Materials Handling Conference in the Robert E. Lee Hotel in Winston-Salem, N. C., on April 21.

The three speakers at the morning session were S. R. BROOKSHIRE, Engineering Sales Co., Charlotte, N. C.; ROBERT NEWSON, R. J. Reynolds Tobacco Co., Winston-Salem, N. C.; and D. E. HENDERSON, N. C. State College, Raleigh, N. C. Brookshire gave an excellent talk, illustrated by a number of photographs, in which he told of the many recent developments in materials handling equipment. Most of his illustrations were from textile mills in the Piedmont-Carolina area.

Complementing Mr. Brookshire's talk, Bob Newson, brought out the importance of the industrial relations aspect of new materials handling equipment. Even the finest new equipment will not save money or do its job well, said Newson, unless the men running it want it to work.

Following Newson's talk, D. E. Henderson presented a film, "Careers in Conveyors."

In the afternoon, the engineers and production men attending the Conference divided into two groups and made inspection trips to the Winston-Salem plant of Western Electric Co., who manufacture radar equipment in this plant; and to R. J. Reynolds Tobacco Co.

At the evening session, following dinner, R. F. BERGMANN, Vice President, Chief Engineer, and Director, Link-Belt Co., Chicago, Ill., made a talk on "The Economics of Materials Handling Systems." Mr. Bergmann pointed out that mechanization of materials handling equipment and the design of new equipment has, in the past thirty years, reduced both direct and indirect labor to about ⅛ of that formerly required on each finished product produced. This is an average figure for industry in general.

◆

C & D Batteries Appoints Pope

MARK C. POPE, 513 Whitehead Building, ATLANTA, GA., has been appointed Southern Division Manager of C & D BATTERIES, INC., of Conshohocken, Pa. They manufacture a complete line of industrial storage batteries and battery chargers. Mr. Pope has spent more than twenty years in the storage battery industry in the Southeast.

In these high times you want full value from every Btu in every pound of coal you buy. It's costly to guess!

Richardson Coal-weighing, Conveying and Feeding Systems provide you with a sure, constant check on the operating efficiency of boilers. Only by weighing and recording every pound of coal burned by each boiler can you spot and rectify inefficiencies in those units which aren't giving you full value. By comparing evaporation rates or kwh. produced with weight of coal consumed, dollar losses can be stopped at the source.

Richardson systems are engineered with stationary, portable or elongated conveyor-scale combinations and are adaptable to all plants and central stations for either pulverizer or stoker-fired furnaces.

Put *every* Btu to work! Keep your records straight, by weight, *all* the time, with one of the many types of Richardson systems. For more details call your nearest Richardson office or write for Bulletin No. 1143.

GUESSWORK GOES OUT

WHEN RICHARDSON

COAL SCALES MOVE IN!

Richardson Scale Co.
Clifton, New Jersey
Atlanta • Boston • Minneapolis
Cincinnati • Wichita • Montreal
Omaha • New York • Pittsburgh
San Francisco • Toronto • Buffalo
Chicago • Philadelphia • Houston

Richardson

6372 MATERIALS HANDLING BY WEIGHT

NEW EQUIPMENT for Southern Industry

Hand Torch

G-1 PRESSURE PRODUCTS CORP., 140 N. Dearborn St., Chicago 2, Ill., has announced a new portable "Prepo" hand torch which lights instantly with a match, doing away with pouring, pumping, and priming characteristics of ordinary blow torches. "Prepo," compounded of petroleum hydrocarbons and packaged in a disposable container, is self-pressurizing at normal temperatures. It takes about 30 seconds to remove an empty container, throw it away, install a new fuel container, and be ready to go again.

The company's industrial torch comes with two easily interchanged burning tips; the largest tip throws a long, broad flame for work where a great deal of heat is required quickly; the other has a long pinpoint flame ideal for soldering, etc. Industrial uses include heating metal for bending and reshaping, soldering, loosening of "frozen" bolts and nuts, paint removing, and sweating lugs on heavy cable.

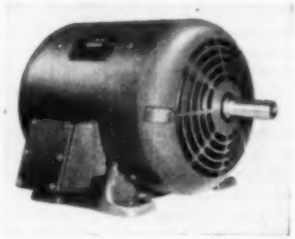
◆

Chemical Motors

G-2 WESTINGHOUSE ELECTRIC CORPORATION, Box 2099, Pittsburgh 30, Pa., is producing new type CSP life-line motors especially designed for applications where corrosive fumes and liquids are encountered.

Frames, brackets, hoods and other exposed parts are alkali-cleaned, hot-water rinsed, then rinsed in chromic acid spray. After drying, they are sprayed with phenolic-alkyd-type enamel and baked. Additional protection is provided by a coat of gray enamel and two to four baked dips of thermoset varnish, followed by a final coat of gray lacquer.

These motors use bronze split-hub, clamp-type blowers for corrosion resistance. Rotating neoprene slingers on the shafts between rear brackets and hoods are used to prevent the entrance of dirt or liquids into the bearing housings. Stator windings are double-dipped and baked in thermostat varnish. All hardware is dipped in slushing compound prior to assembly. The gasketed conduit box can be rotated to meet installation requirements.



Factory-sealed prelubricated bearings are used. No lubrication is needed for the life of the bearings.

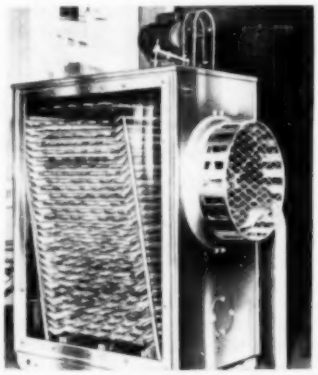
Free additional information is available to readers of Southern Power & Industry. Check item code number on the postage free service coupon post card provided on p. 17.

Cooling Towers

G-3 THE MARLEY COMPANY, INC., Fairfax and Marley Roads, Kansas City 15, Kans., have announced that the new 1950 Aquatower line will have an additional size plus improvements on all models.

A 20-ton Aquatower will be available to meet the increasing demand for this size unit. Interiors of all towers will be lined with a thick coating of rubber to make the interior of the tower impervious to corrosion. A new quiet, deep pitch fan is used which operates at one half the usual speed. The rubber lining plus the slow speed fan gives unusually quiet operation.

The units are a packaged product, completely assembled, ready for use. They are sized from 3 to 50 tons. They still have the open distribution basin, redwood filling from top to bottom, totally enclosed motors and complete basin fixtures. Further information is obtainable in the manufacturer's Bulletin AQ-50.



FREE READER SERVICE

To obtain free information on this equipment, circle number on the page 17 free post card.

Gravity Feed Oilers

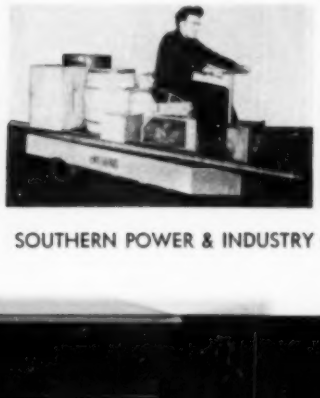
G-4 TRICO FUSE MFG. CO., 2948 North 5th St., Milwaukee 12, Wis., is producing gravity feed oilers to automatically supply a measured amount of lubricant to plain, stationary, and anti-friction bearings. New ratchet control mechanism provides instant

adjustment of the oil feed. Spring mechanism locks adjustment into position to avoid changing rate of feed. A protecting cap shields the mechanism from dust and dirt. Oil supply is visible through plastic reservoir. The oiler is available in 1, 2, 4, and 8 oz capacities; ⅛, ¼, and ⅜ inch pipe thread.

◆

Materials Handling Equipment

G-5 LEWIS-SHEPARD PRODUCTS, INC., Watertown, Mass., announces an addition to their line of materials handling equipment known as the "ToteMaster" Burden Carrier. The model has a 2000 lb capacity with 21 sq ft of loading space. It is powered by a 20 hp 4 cylinder high compression water cooled engine, and is governor controlled for speeds up to 20 mph.



How many ways can you cut costs with HOFFMAN

Heavy-Duty Vacuum Cleaning

☐ ***SAVE PRODUCTION TIME?*** Clean walls, floors, overhead, machinery right during normal operations. Clean semi-finished products faster as part of regular production operations.

☐ ***SALVAGE VALUABLE MATERIALS?*** Central collection may enable you to recover valuable materials which now must be blown, swept or washed away.

☐ ***REDUCE PRODUCT DAMAGE?*** Improve quality control and lower the unit cost by protecting your product against dust damage before, during or after production.

☐ ***LOWER MAINTENANCE COSTS?*** Better plant-keeping with Hoffman vacuum cleaning means longer machinery life — fewer breakdowns due to the abrasive wear of dust. Also, save cleaning time and manpower.

☐ ***BETTER INSURANCE RATING?*** By reducing the health and fire hazards of dust, you may be able to effect worthwhile savings on your insurance cost.

The Hoffco-Vac, one of four sizes of heavy-duty, portable cleaners.

Consult your nearest Hoffman representative:
ATLANTA, GA.: A. J. Kroog, P. O. Box 9, Station E
DALLAS, TEX.: Tate & Roe Co., 5542 Dyer Street
EL PASO, TEX.: Boyd Engineering Co., 718 N. Stanton St.
HOUSTON, TEX.: Hayleff O'Neill, 2510 Travis Street
HUNTINGTON, W. VA.: H. Y. Kester, Box 1448
KNOXVILLE, TENN.: Leicart Engineering Co., P. O. Box 500
LOUISVILLE, KY.: J. F. Sheuse & Co., 2100 Woodford Place
LYNCHBURG, VA.: Campbell Xing Co., P. O. Box 295
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NEW ORLEANS, LA.: H. J. Kelly, 816 Howard Avenue

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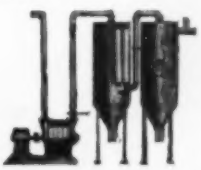

Hoffman builds all sizes of stationary systems for multi-sweeper cleaning.

HOFFMAN MULTISTAGE CENTRIFUGAL BLOWERS AND EXHAUSTERS

Give long years of dependable service. Wide range of capacities, pressures and vacuum — all with low power consumption.

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STANDARDAIRE

Precision Built Axial Flow

BLOWERS handle the movement of air gently by screw action instead of paddle action, as is the case with other positive displacement blowers. Result — air pulsations and noise are reduced to a surprisingly low level. In Standardaire Blowers the revolutionary new form of the rotors marks a major improvement in blower design. The rotors are produced by an exclusive rotary generating process, the form and helix being controlled entirely by the machine gears. This produces rotor threads that are accurately shaped and machined to close tolerances for efficient blower operation. The design of the rotors and other construction details makes possible internal compression to a degree that Standardaire Blowers operate on a modified adiabatic cycle with a lower mean internal pressure. This important feature, together with advanced engineering throughout, makes for a quiet, compact, efficient blower with long service life.

Write for Standardaire Blower Bulletin covering dimensional information. Publication No. 88.

The Standard Stoker Company, Inc.,
Dept. C-10, 370 Lexington Ave.
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Standardaire Blower equipped with unique pulley attachment for belt drive, when required.

THE STANDARD STOKER CO • INC •

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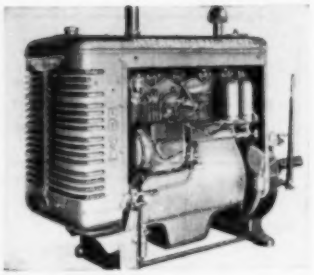


Diesel Engines

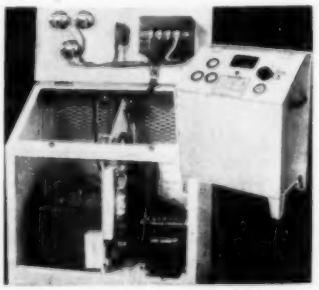
G-6 INTERNATIONAL HARVESTER CO., 180 North Michigan Ave., Chicago 1, Ill., is now producing diesel power units incorporating new design features for increased horsepower and improved performance.

New features of the basic "9" engine include: redesigned pre-combustion chamber and piston; the "A" series fuel injection pump; simplified injection nozzles; counterbalanced crankshaft and new connecting rods. The improvements establish a higher compression ratio and greater burning efficiency than previous models. In addition, the unit has the inbuilt gasoline conversion all-weather starting system and full-pressure lubrication of moving parts.

◆

Battery Charger

G-7 THE AUTOMATIC TRANSPORTATION COMPANY, 149 West 87th St., Chicago, Ill., has announced a battery charger with duplex control to improve charging and battery protection. A single control governs two clocks, one of which limits charging to a maximum of nine hours, and another which shifts the unit from the initial high charging rate to the finishing rate when voltage is up. Thus, batteries charge at the high rate only as long as actually necessary. Operation is simplified so the user need only plug in the battery and set the dial face to "start".



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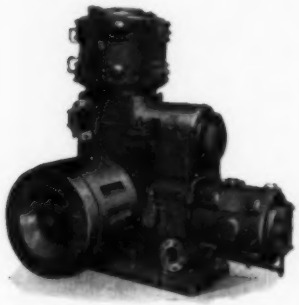
Air Compressors

G-8 INGERSOLL-RAND COMPANY, 11 Broadway, New York 4, N. Y., has developed a new design in modern, packaged-type, heavy-duty, electric-driven air compressors. Sizes range from 125 to 350 hp and for continuous full-load service and two-stage compression to 80-125 psi discharge pressure.



The new model embodies a single vertical low-pressure compressor cylinder, a horizontal high-pressure cylinder, and a synchronous motor mounted directly on the crankshaft.

The unit is suitable for use in factories, shops, mines, powerhouses, and large construction jobs. Write the manufacturer for full information.

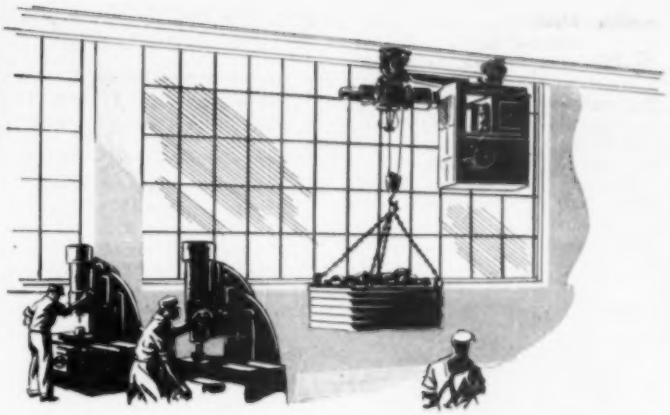
◆

V-Belt

G-9 THE B. F. GOODRICH COMPANY, Akron, Ohio, announces a new "High Capacity" multiple V-belt, with a 40 per cent increase in horsepower rating over comparable sizes of standard V-belts used for this service. The belt is also available for use where dissipation of static is essential.

Increase in the capacity of the new belt has been effected without stiffening the belt construction or reducing any of the safety factors inherent in the standard types.

Advantages of the increased capacity belt are that fewer belts have to be used to get the power transmission desired.



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KEEP in mind these important advantages which "through-the-air" handling alone gives you. Unrestricted use of floor space, accurate spotting of work, higher stacking, greater dependability and safety, lower upkeep and longer life. On the production line or when storing or warehousing, they add up to worthwhile savings.

For a great many years, we have devoted our entire facilities to the manufacture of cab-operated and floor-controlled hoists, and overhead traveling cranes—and to laying out plant systems to make them the most efficient of all lifting and conveying tools.

May we show you pertinent data on installations similar to yours?

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CRANE & HOIST CORPORATION

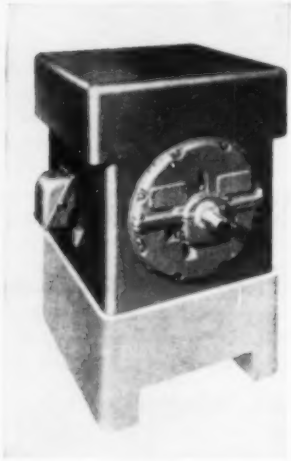
Makes and sells all three lifting tools for airborne shop loads

455 SCHUYLER AVENUE • MONTOUR FALLS, N. Y.

Auxiliary Motor

G-10 GENERAL ELECTRIC COMPANY, Schenectady 5, N. Y., has announced a new modified base-ventilated motor, designed specifically for external applications such as driving power station auxiliaries mounted out-of-doors.

Available in ratings ranging from 200 to 3000 hp, the motor was developed for those outdoor installations where the totally-enclosed fan-



cooled units are not available. The motor is designed to be mounted on a concrete base which is raised sufficiently from the ground to allow contaminated ambient air to flow through the foundation at high velocity. Ventilating air enters the motor through a vertical passage in the base, and is pulled from the ambient air stream at low velocity, thereby reducing possibility of water or foreign matter being carried up vertically into the motor. Baffles are fabricated within the air intake passage to eliminate even small amounts of foreign matter. After circulating through the motor, the ventilating air is exhausted from the top, a new design feature.

◆

Portable Maintenance Equipment

G-11 SNAP-ON TOOLS CORPORATION, Kenosha, Wis., announces production of a large size "Roll-Cab" designed especially for industrial use. The equipment provides the user with a "shop-on-wheels" that can be rolled right to the job; and, as necessary tools, equipment, and material are carried in the cab, it eliminates time wasted

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on repeat trips to the tool crib.

The top measures 45" x 24" to provide working space and a reinforced solid steel top plate with a cemented masonite covering makes it possible to mount a vise or bench grinder. The unit has seven drawers for stor-

age space in addition to two compartments for larger items, all of which can be locked when not in use. A light on top swivels in any direction to provide illumination for work. An electrical supply inlet is incoporated in the cab, and two double outlets are included for electrical tools. Foot brakes lock the cab in position.

◆

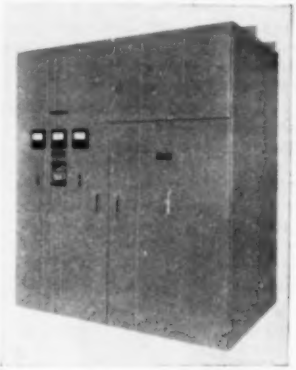
Powder Actuated Tools

G-12 MINE SAFETY APPLIANCES Co., Braddock, Thomas and Meade Sts., Pittsburgh, Pa., has developed a new design in powder actuated tools for driving steel studs into metal, concrete, or masonry. The tools are used to install electrical equipment, pipe and duct hangars, metal door frames, and other fixtures.

A new feature of the equipment is a spring-impelled firing pin which is positive in action, yet is said to be safe and tamper-proof. No matter how slowly pressure is applied to the new tool, it can be operated satisfactorily, thus permitting its use in closely confined locations without misfiring because of hesitation by the operator. Safety features of the previous models have also been retained, according to the manufacturer.

Motor Control

G-13 WESTINGHOUSE ELECTRIC CORP., 306 Fourth Ave., Pittsburgh 30, Pa., is producing a new, full or reduced voltage, synchronous motor control unit for operating and protecting all types of synchronous motor drives. They are supplied as factory wired units, requiring only external connections when installed.



A new type ASR polarized slip-frequency relay, with associated control, provides automatic synchronization with maximum pull-in torque at the proper speed and phase relation, thus minimizing line disturbance. Pull-out protection is incorporated to stop the motor automatically if it pulls out of step.

One thermal protective relay guards the stator against sustained overloads; another guards the rotor damper windings against failure of the motor to start. Time delay undervoltage protection can be supplied on all models.

◆

Magnetic Sweeper

G-14 ERIEZ MFG. CO., Erie, Pa., is producing a low-cost permanent magnetic device for sweeping up or retrieving ferrous material from floors.

The magnetic tube rotates through a full 360 degrees, thereby presenting the maximum surface area for collection. It operates like a carpet sweeper, with the magnetic tube mounted between Neoprene wheels. Ferrous material adheres to the magnet and spreads itself over the cir-

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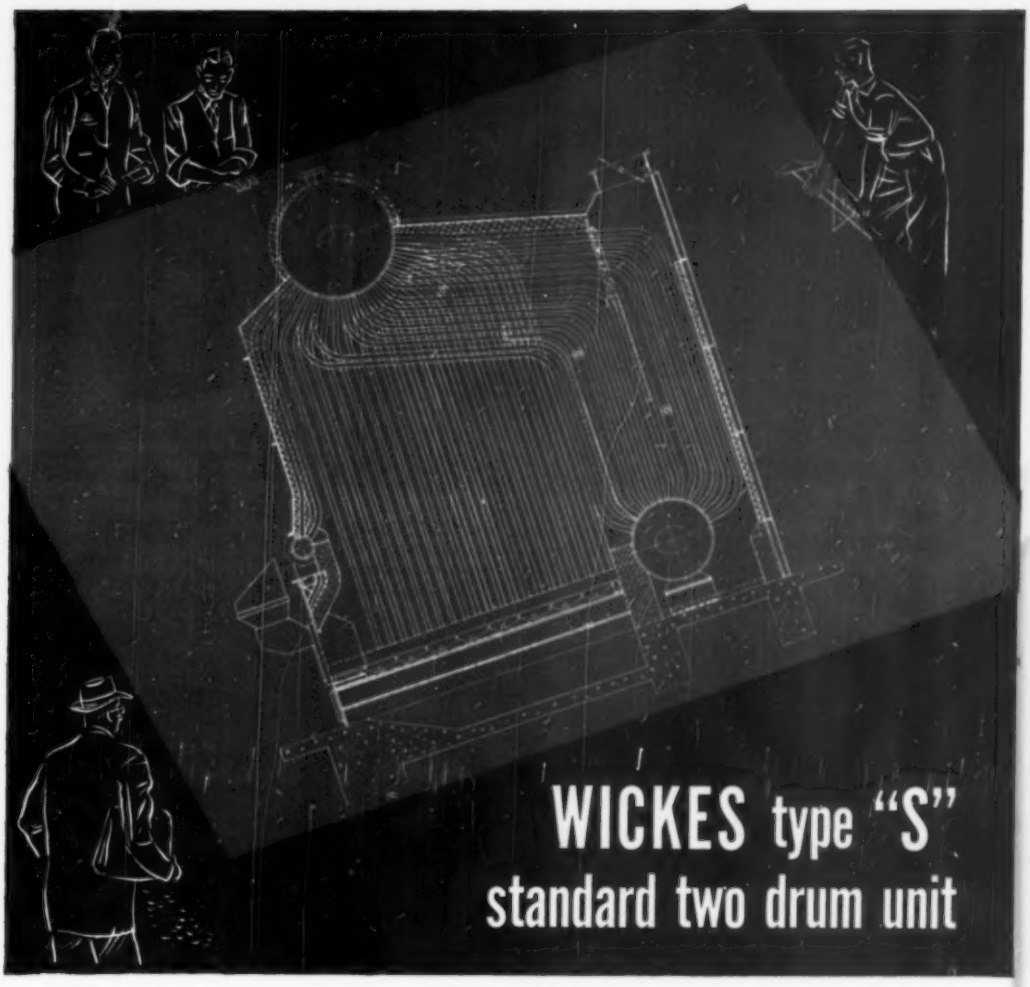

the WICKES Boiler Co.

SAGINAW, MICHIGAN

The Wickes Type "S" Standard 2-Drum Unit is designed for industrial plants and particularly where operating and maintenance forces are small. This unit has a generating capacity of 15,000 to 50,000 lbs. steam per hour. It is adaptable to any standard method of firing—oil, gas, single retort underfeed stoker, or spreader stoker, and should the fuel market change, any of the above methods of firing may be readily substituted. With the Type "S" Unit, space conditions are no problem, since the design of the furnace makes this unit a low head boiler. The depth, width and distance between drum centerlines being variable in the standard design, virtually any space situation can be met. Your boiler problems will receive our engineers' consultation and recommendation without obligation.

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Specify CAMCO for Extra Value

For Better Performance Order All Companion and Slip-on STAINLESS STEEL FLANGES Up To and Including 2" I.P.S. Machined from Drop Forgings They COST NO MORE than Competing Cast Flanges

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- Cylindrical Fittings up to and including 2" I.P.S. are machined from bar stock.
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Orders filled promptly from stock from ⅛" to 4" I.P.S. inclusive in types 304, 316 and 347 stainless steel.

If your local jobber cannot supply you with CAMCO fittings, write today for name of nearest distributor.

CAMCO PRODUCTS INC.

25 Fox Street
New Haven 13, Connecticut

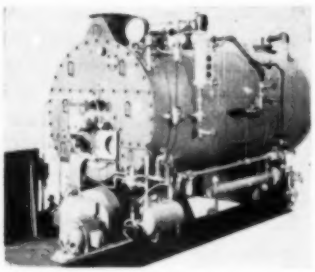
cumference to a thickness of about ¾". Unloading is accomplished at either end by pushing wiper ring from one end of tube to the other, where a non-magnetic section causes load to be released.

The sweeper is available in sizes ranging from approximately 12 inches to 36 inches. Prices range from $26.50 to $106.00 depending upon model and size.

◆

Boiler G-15

CLEAVER-BROOKS COMPANY, 326 E. Keefe Ave., Milwaukee, Wis., has added a new boiler to its line of self-contained 15 to 500 hp boilers. The new unit, called the Model LR, features a rotary burner, simple, compact and fully automatic, to provide flexibility in burning heavy oils or industrial gases. A single, low-speed, low-power consumption blower furnishes all the air for combustion, which results in less weight and reduction in sound levels.



A totally enclosed drip-proof and dust-proof panel protects all major electrical controls. Electronic combustion safety devices and dual low-water cutoffs are standard equipment. The model is of all-welded construction and meets standards of the A.S.M.E. boiler code.

HOW are other plant engineers handling today's problem of maintaining efficiency of air conditioning equipment? What short-cuts are proving successful in conserving water—saving operation expenses through effective maintenance cleaning?

In this new booklet you will find the answers to these and such other problems as . . .

- Controlling Slime
- Removing Hard Water Scale
- Cleaning Water Lines
- Removing Rust

Then, too, there is valuable information on maintenance cleaning of such allied equipment as . . .

- Evaporative Condensers
- Ammonia Condensers
- Glass Filtering Units
- Finned Air-Wash Coils
- Aluminum Plates and Screens

If you think you could use a copy of this booklet—and the number is F7383—simply put your name and address on a penny post card and mail to Oakite Products, Inc., 23A Thames St., New York 6, N. Y.

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Fork Truck

G-16 CLARK EQUIPMENT COMPANY, Industrial Truck Division, Battle Creek, Mich., has added to its line a 10,000-pound capacity fork-lift truck, gasoline powered and equipped with the Dynatork Drive. The new model is known as the Utilitruc-100.

The Dynatork Drive is standard equipment on the new truck, and the only type of drive available. It transmits engine power through a magnetic field, across an air gap, eliminating need for any type of friction clutch. The conventional transmission is replaced by constant-mesh forward-and-reverse gearing.

Other features are the pivoted steering-axle assembly designed to increase stability by maintaining all four wheels in constant contact with the road surface; and a 6-cylinder industrial-type engine of 209 cu in. displacement, developing 50 brake horsepower at 1800 rpm.

•

Gas Unit Heater

G-17 REZNOR MANUFACTURING COMPANY, Mercer, Pa., is now producing its 1950 gas unit heater. Principal features of the new model are: easier accessibility to the interior for servicing; more compactness; "Perlite" finish—a soft, neutral gray-green metallic paint, which gives it a heavier protective coat than previously used.

Catalog and reference book on the new heater are available.

NO NEED TO JAM A DART

to get a Drop-tight Joint

Drop-tight Without Jamming! — that's the reason Darts are your best buy. There's no need to use excessive wrenching to get a tight connection. The two bronze seats have the wide, true-bearing surfaces that come only from precision grinding. Thus you can tighten a Dart easily without jamming the seats. Uncouple them easily, too, for reuse again and again.

And to give extra resistance to stress and stretching, both body and nut are made of high-quality, air-refined malleable iron . . . practically indestructible.

No wonder Darts always cost less in the long run . . . always give longer, better service.

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They are not affected by dust, dirt or corrosion and have many definite applications where open contacts are not suitable. Various types available. MERCOID is your guarantee of the best in mercury switches. Further information sent upon request.

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THE ONLY 100% MERCURY SWITCH EQUIPPED CONTROLS

Designed to automatically regulate electrically operated equipment in accordance with changes in temperature, pressure, vacuum, or fluid level.

If you have a problem on the automatic control of pressure, temperature, liquid level, mechanical operations, etc., it will pay you to consult Mercoid's engineering staff — always at your service.

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MANUFACTURERS OF AUTOMATIC CONTROLS FOR HEATING, AIR CONDITIONING, REFRIGERATION AND NUMEROUS INDUSTRIAL APPLICATIONS. ALSO MERCOID BRAND MERCURY SWITCHES.

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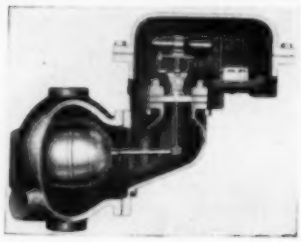
Electric Controller

G-18 McDONNELL & MILLER, INC., Wrigley Bldg., Chicago 11, Ill., has recently announced a new explosion-proof float-operated electric controller for water tanks, receivers, and other liquid storage systems. Designed for use under conditions where a conventional type controller is not applicable, the new model, No. 65, can be used to "make" or "break" electrical circuits at either high or low levels—for example, controlling motors, signal lamps, electrical elements.



The unit has been Underwriters' tested and approved for use under the following hazardous conditions: Class I, Group C—atmospheres containing ethyl-ether vapors, ethylene, or cyclopropane. Class I, Group D—atmospheres containing gasoline, petroleum, naphtha, benzine, butane, propane, alcohols, acetone, benzol, lacquer solvent vapors, or natural gas.

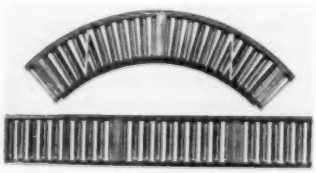
This float switch incorporates packless construction, heavy-duty mercury switch, and totally enclosed wiring and terminals. It is furnished with standard and reverse switch. A circular covering the No. 65 controller may be had by writing the manufacturer.

◆

Gravity Conveyor

G-19 THE RAPIDS-STANDARD COMPANY, INC., Grand Rapids 2, Mich., has announced a lightweight aluminum gravity conveyor known as the "Rapid-Roller". The equipment is designed to handle materials similar to those moved on steel rollers — boxes, crates, kegs, light drums, lumber, etc. The new aluminum conveyors are adapted to outdoor installations where steel might rust or corrode; or for use in dusty or hazardous locations where non-sparking equipment must be specified. It is manufactured in five, eight, and ten-foot sections and 12-inch and 18-inch widths. Rollers project above side channel frame, permitting movement of wide sheets of plywood, hardboard, or other panels around curves in the conveyor line.

These new sections can be connected directly to other Rapistan power belt and gravity conveyors and used with existing lines.



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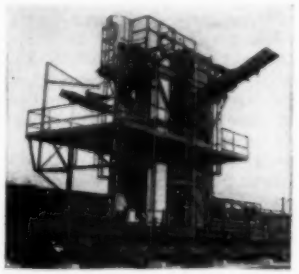
◆

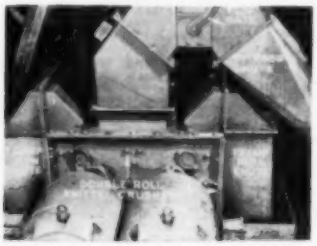
Icer

G-20 LINK-BELT COMPANY, 307 N. Michigan Ave., Chicago 1, Ill., has developed the Rico Master Car Icer for doing both top icing and bunker icing. The equipment is a self-propelled machine traveling on rails at approximately the same elevation as the refrigeratcr car tracks; and is designed to crush blocks of ice and do bunker icing, salting and top icing of cars on two lines of track (one on each side), rendering a complete icing service under control of an operator on the machine. Travel speed is 300 fpm. The machine can be furnished with an auxiliary platform at an elevation near the top of the refrigerator cars. Control equipment can be arranged so that operator on the machine can start and stop all conveyors bringing ice blocks from storage to the machine. Voice communication can be provided between the operator, the storage house, and other stations.



Double Rotor Crusher

G-21 STEPHENS - ADAMSON MFG. Co., Aurora, Ill., has introduced the S-A Double Rotor Knittel Crusher. The unit is equipped with two rotors driven by separate, direct coupled motors. Synchronization is unnecessary, as the crushing sectors on the rotors operate independently, first splitting the coal on initial impact and then crushing it on the breaker plates. Sized slots in the crusher grate bars determine maximum size of material.



Since the triangular sectors are held in position only by centrifugal force, they are free to adjust position on impact with tramp iron, or other foreign material. Hinged fingers on each side of the crusher allow the sectors to bat tramp iron out without damage to the crusher. Feed openings are large, and the use of only two gangs of sectors on each rotor allows maximum sized lumps to be handled.

◆

Time Delay Relays

G-22 WESTINGHOUSE ELECTRIC CORPORATION, 306 Fourth Ave., Pittsburgh 30, Pa., is producing new type AM pneumatic time delay relays, with adjustable delay from 0.2 to 200 seconds. A large graduated dial permits delay adjustment throughout this range for general industrial timing functions.

Micro - movement - type precision snap switches with double "make" and "break" contacts are used. The relays are available as open or enclosed units. Operating coils are designed for satisfactory service down to 85 per cent of rated voltage. Coils are available in ratings up to 600 volts ac, 25 to 60 cycles.

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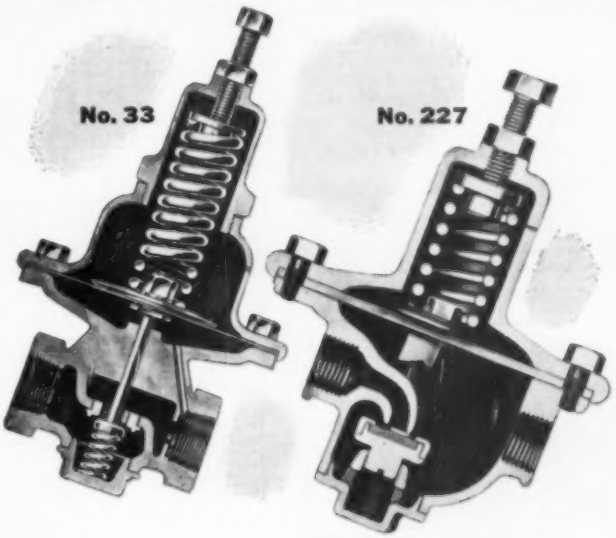
Stop Losing Money

in Pressure Reducing . . .

USE

MASONEILAN

PRESSURE REGULATORS



Masoneilan Reducing valves make a hit with production and maintenance men in all types of industries because they furnish economical pressure control. Their dependable operation, low maintenance cost and minimum time-out-of-service saves money through accurate control and reduced waste.

No. 33 for steam and air service — Sizes from ¼" to ¾". Reduced pressure ranges 2-20; 20-40; 40-100 psi. Maximum working pressure 200 lbs.

No. 227 for water service — Sizes ¼" to 2". Reduced pressure ranges 10 to 60 psi. Maximum working pressure 150 psi. Also available for air service from ¼" to 1".

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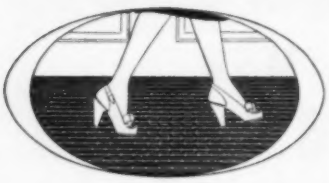
THE **SAFE**
OPEN STEEL FLOORING
IS **TRI-LOK**



No object over ½ square inch can pass through super-safe U-Type Tri-Lok Flooring. Fabricated without bolts, rivets or welds, it is unsurpassed for plant installation, walkways, loading platforms. Efficient distribution of concentrated loads . . . maximum free opening for light and air. Write for Bulletin JU-1140.

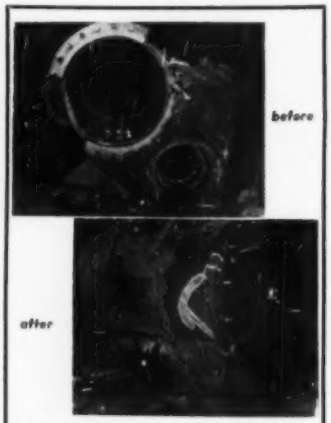
DRAVO CORPORATION

National Distributor for the Tri-Lok Company

Dravo Bldg., Pittsburgh 22, Pa.

Sales Representatives in Principal Cities

DRAVO



METALOCK

The accident which occurred to this steam engine cut the production of the Granite City Steel Mills severely.
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CATALOGS AND BULLETINS

(Continued from page 18)

B-30 **INDUSTRIAL CLEANING**—Booklet, 18 pages—"Power Plant Cleaning" is a digest of 71 maintenance cleaning procedures designed to save time and expense. Covers use of Oakite materials in steam central systems, electrical power plants, and Diesel power plants.—OAKITE PRODUCTS, INC., 22 Thames St., New York 6, N. Y.

B-31 **POWER DRIVE**—List No. 22-A, 4 pages—Illustrates and describes the power vise stand, a portable power drive for hand pipe tools which weighs only 140 pounds. Gives data on time required for operation, specifications, and accessories.—THE OSTER MANUFACTURING CO., Cleveland, Ohio.

B-32 **ATOMIZER**—Catalog, 20 pages—Explains use of the West Atomizer, operated by air-pressure, steam pressure, or carbon dioxide gas pressure to produce an insecticidal fog for insect control in industrial plants and warehouses.—WEST DISINFECTING CO., 42-16 West St., Long Island City 1, N. Y.

B-33 **CONVEYORS**—Bulletin FK-25, 24 pages—Conveying systems for industrial applications are explained, including installational photographs, equipment diagrams, and engineering data.—FULLER COMPANY, Catasauqua, Pa.

B-34 **COMPRESSORS**—Bulletin C-5 15 pages—Fuller rotary compressors and rotary vacuum pumps are described. Text accompanied by line diagrams, photographs of equipment and typical installations, specifications, etc.—FULLER COMPANY, Catasauqua, Pa.

B-35 **GAS BURNERS**—Bulletin, 16 pages —"Proof of the Pudding" presents letters from ten users of Iron Fireman commercial gas burners, accompanied by installational photographs, to give case histories of the equipment in operation at specific plants. —IRON FIREMAN, 1101 W. Adams St., Chicago 7, Ill.

B-36 **DUST COLLECTOR** — Brochure, 16 pages—"Type 'S' Dust Collector" is described and illustrated with plant photographs and diagrams. Table of specific monetary savings possible by use of dust system is included, and list of users is given.—BUBAR DUST SYSTEMS, INC., Old Lyme, Conn.

B-37 **PROPORTIONING** — Bulletin No. 3849, 6 pages—Describes a proportioning and blending system using the Conveyometer, a self-testing feeder-weigher designed for stream delivery of small, crushed, granular or non-flushing, ground materials.—RICHARDSON SCALE COMPANY, Clifton, N. J.

B-38 **SHEET PACKING**—Leaflet, 4 pages —Describes various types of sheet packing for handling liquids, gases, and abrasives. Lists specifications and outlines uses of the different kinds of packing and describes materials used in their construction.—THE B. F. GOODRICH COMPANY, Akron, Ohio.

B-39 **GENERATORS**—Bulletin GEA-5415, 8 pages—Deals with generators for standby, portable, and prime source power in widespread fields of application. Gives three typical installation stories, describes Tri-Clad protection, and tells about construction features, mechanical modifications, and performance data.—GENERAL ELECTRIC COMPANY, Schenectady 5, N. Y.

B-40 **SEWAGE AND TRASH PUMP**—Bulletin 5400K-1, 16 pages—Describes a new sewage and trash pump with recently developed single passage bladeless impeller for handling fibrous and trashy material in sewage operation and also in the food processing industry.—FAIRBANKS, MORSE & CO., 600 South Michigan Ave., Chicago 5, Ill.

B-41 **POWERHOUSE CRANE**—Sec. 300—Unit 73, 8 pages—"How Whiting Cranes are Serving the Utilities" illustrates variety of cranes for use in the power industry. A partial list of over 350 power house crane installations is included.—WHITING CORPORATION, Harvey, Ill.

B-42 **LUBRICATION** — Data Book No. 1-50, 44 pages—Contains information on lubrication of interest to those in charge of operation and maintenance of mechanical equipment. Describes product intended to prevent wear and corrosion.—FISKE BROTHERS REFINING CO., Lubriplate Division, 129 Lockwood St., Newark 5, N. J.

B-43 **ALUMINUM PAINT**—Brochure, 32 pages — Explains how aluminum paints can be used to best advantage in industry for metal, concrete and masonry and similar non-absorbent surfaces; for weather-exposed wood; and for interior heated surfaces and for decorative purposes. Applicational photographs are included.—ALUMINUM COMPANY OF AMERICA, 661 Gulf Bldg., Pittsburgh 19, Pa.

B-44 **FLY ASH COLLECTOR**—Bulletin "Buell 'LR' fly ash collector", 6 pages—Describes equipment designed for fly-ash prevention on small boiler installations of limited draft. Discusses design, dimensions, layout, and draft resistance.—BUELL ENGINEERING COMPANY, INC., 70 Pine St., New York 5, N. Y.

B-45 **TELEVISION** — Bulletin 1025, 16 pages—Describes the "Utiliscope", wired television, and its applications in industrial and commercial use. Illustrates models available and discusses operation.—DIAMOND POWER SPECIALTY CORPORATION, Lancaster, Ohio.

B-46 **MATERIALS HANDLING**—Bulletin F-H-1, 12 pages—Describes the "Airslide", a type of conveyor for transporting fine, dry materials, without the use of moving parts. Includes applicational photographs and discusses design and operation.—FULLER COMPANY, Catasauqua, Pa.

B-47 **PNEUMATIC CONVEYORS** — Bulletin A-15, 24 pages—"Airveyor" installations are illustrated and described by means of typical case histories in specific industrial plants, with applicational photographs and diagrams. — FULLER COMPANY, Catasauqua, Pa.

B-48 **WELDING FITTINGS AND FLANGES**—Catalog wf-1950, 88 pages—Contains information on seamless carbon steel welding fittings and forged steel flanges. Presents standard schedules with specifications, list prices and sizes, and dimensional tolerances.—GRINNELL COMPANY, INC., Providence 1, R. I.

B-49 **ELECTRICAL RESOLVERS**—Booklet, 12 pages—"ARMA Electrical Resolvers" describes electrical resolvers in two size groups developed particularly for electromechanical computing and control equipment.—ARMA CORPORATION, 254 36th St., Brooklyn 32, N. Y.

B-50 **OIL SEALS**—Brochure, 16 pages—"Johns-Manville Clipper Seal" is handbook on oil seals. Photographs show applications and installation methods. Drawings illustrate construction features. Text prepared for use by designers, engineers, and maintenance men.—JOHNS-MANVILLE, 22 East 40th St., New York 16, N. Y.

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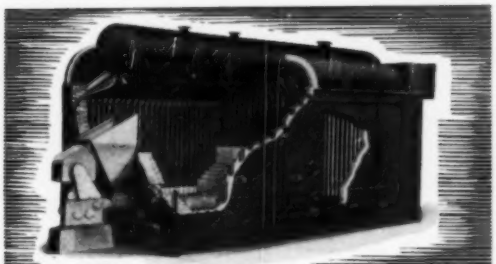

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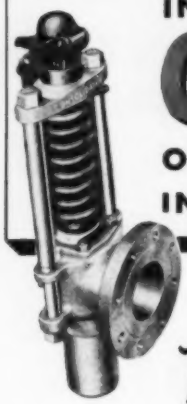

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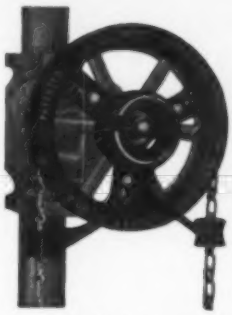

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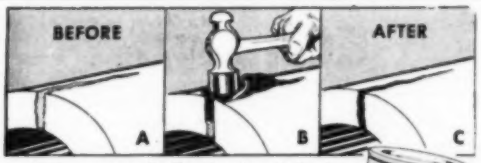

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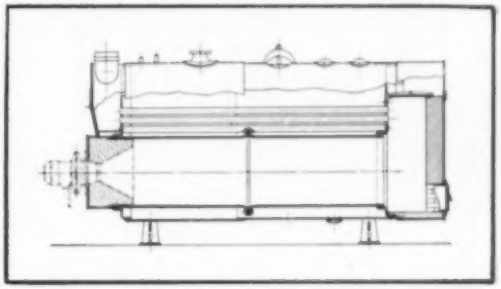

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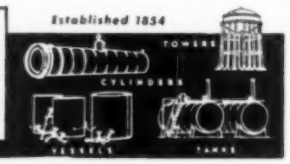

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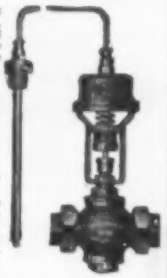
Self-Contained Type.

For complete data ask for Bulletin 7A which, for example, tells all about the Temperature Regulator shown at the right—No. 650.



Hydraulically and Pneumatically Operated.

For complete data ask for Bulletin 6A.

ATLAS Temperature Regulators are used for controlling the temperature of water and other liquids as well as vapors and gases, in all kinds of containers.

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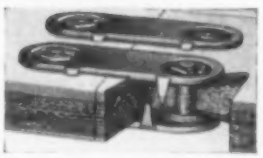

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for insertion into pipelines

"See what's going on"... inside

Fig. 17-28 Tubular Glass Type

Fig. E-811 Flapper Type Single Window

Fig. E-57 Bulls Eye Type Double Window

LEAKLESS TRY COCKS

Designed for 450-650-1500-2500 lbs.

Fig. 13

Ernst Leakless Try Cocks Assure Maximum Safety

Weighted Type Try Cock

Fig. 15

250 lb. Pressure, Bronze, with Iron Weight Double Chain Pull

Fig. 01

Bronze, with Wheel

Spring Type Fig. AS-250

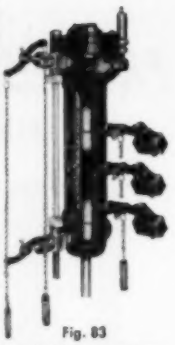

Fig. 83

No. 5 high and low alarm column with vertical gages and DCP weighted type try cocks.

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Fig. 5

Standard vertical bronze water gage, 350 pound design, heavier construction up to 450 lbs. Stainless and forged steel for higher pressures.

Fig. 8

All iron gages for pressure up to 250 lbs., heavier construction up to 350 lbs. Fig. 8SS—Same fittings made in stainless steel.

SPLIT-GLAND TYPE WATER GAGE

INCLINED FOR BETTER VISIBILITY

Water Level Visible from below

Fig. 1

DESIGNED FOR 250-450-650 LBS. W.S.P.

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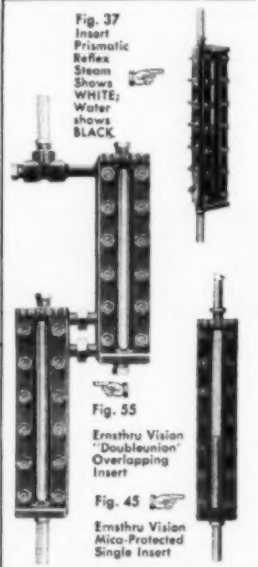

Fig. 37 Insert Prismatic Reflex Steam Shows WHITE; Water shows BLACK

Fig. 55

Ernsthru Vision "Doubleunion" Overlapping Insert

Fig. 45

Ernsthru Vision Mica-Protected Single Insert

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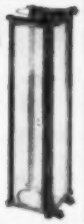
Fig. 31

Ernst Plastic Guard Replaceable Plates

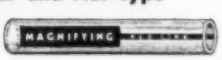
Fig. 10

Plain Sight Illuminator



GAGE GLASSES—Tubular and Flat Type

Flat Type Reflex and Clear



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B—Inside Diameter
A—Outside Diameter
C—Thickness

Fig. 21—Lip Mold Rubber Gasket

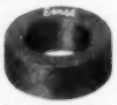

Fig. 22—Standard Rubber Gasket

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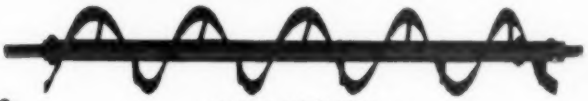


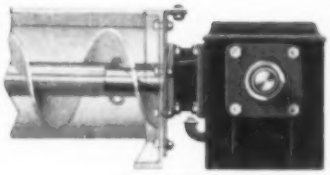
RIBBON CONVEYOR

COUPLINGS

FABRICATED STEEL BOX END WITH CONTINENTAL SKF PILLOW BLOCK, AND SPLIT DUST SEAL GLAND

HANGERS

CAST IRON OUTSIDE PATTERN BOX END WITH FEET



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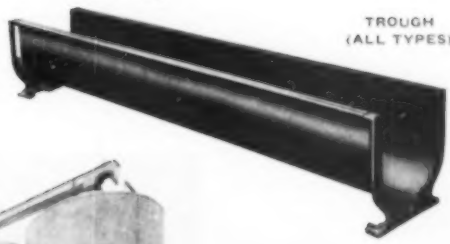
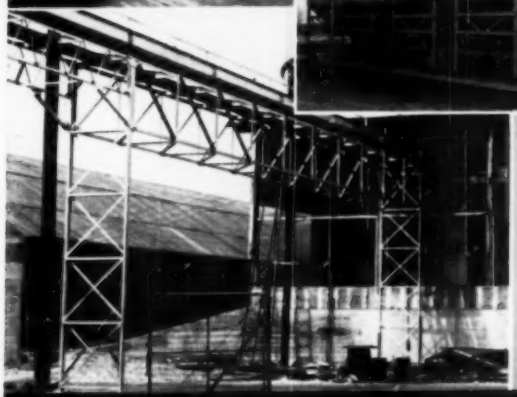


TROUGH (ALL TYPES)

CG-5005



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